The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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No. 1406

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The Chemical Age

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Speed

THE Englishman and the Chinaman ran helter-skelter down the escalator, crashed their way through a mass of people leaving an underground train and dashed, hot and dishevelled, through the closing door. As they flung themselves into a seat, the Englishman said: "There. We've saved two minutes by that." "Good," said the Chinaman, "What shall we do with them?"

This ancient story of the different views on hurry of eastern and western mentalities came inevitably and unbidden to our mind when, the other day, we took a busman's holiday to hear Major Halford, chairman and managing director of De Havilland, speak upon the subject of "Jet Propulsion." The chair was taken by no less a person than Air Commodore Whittle. The kings of speed were assembled, and seemed not a whit surprised by what they heard. It is not so very long ago since any form of human travel at speeds over 100 miles an hour seemed enormous; 150 miles an hour was outside the bounds of imagination. Yet a year ago, when Air Commodore Whittle flew into his home aerodrome and was asked by his son at what speed he was flying, the figure of 400 m.p.h. was received without enthusiasm, and the son was later heard explaining to a friend that "Daddy wasn't really trying."

Major Halford already has designs for a trans-oceanic passenger machine holding 50 people to cross the Atlantic at 600 m.p.h. It will take less time to travel from London to New York than it did 40 years ago from London to Paris. Six of these passenger machines, costing together about £3,000,000, could take each year, without hurrying themselves to change round quickly, as many passengers as the *Queen Mary*, costing perhaps four times as much to-day. Moreover, because the plane would fly sufficiently high to be out of the weather and in rarefied air, and because of its quick change-round, the passenger fares would be less for this high speed than at present for air travel at to-day's speeds. Jet propulsion, there can be no doubt, has brought upon us a complete revolution in travel. It has brought countries nearer to each other. It has increased their risks in war. It has increased their contacts in peace. We shall have to adjust ourselves to a world in which speeds are normal that were undreamed of in our youth. Whether that is a good thing or a bad we forbear to argue: it is a fact that we have to face. The human being will adapt himself to the changed

On Other Pages

conditions. That in itself is rather a wonderful thing. For æons, Nature has been adapting her children slowly through the ways of evolution to changed environments. Now, within the short space of less than a lifetime, the human race can adapt itself to a tempo of life which would have seemed impossible a century ago. Nor, strangely enough, has our span of life been shortened by the speed at which we live. We crowd far more into the day than our ancestors could possibly have done. Verily, we live! Yet the human frame does not wear out more quickly; on the contrary, our expectation of life has increased.

What is the explanation? Is it not in the application of science? Not the application of a particular science, but the continued advance of science all along the front. Without advances in medical science we could not have taken advantage of the advances in physical science that have enabled us to live fuller lives—to save our two minutes here and there, to crowd so much more into the day's work and play. All the sciences help us to live more dangerously, more adventurously, " to fill the unforgiving minute with sixty seconds' worth of distance run." It has become a condition of survival, in this turbulent and hurrying age, that the production of goods should be speeded up to the same extent as the jet propulsion experts are speeding up air transport. To accomplish that increased rate of production is the function of modern management, and of modern industrial science. There is no room for the slow, for the slacker, in these days of speed. Those who remember the spacious life of 50 years ago, when we kept business appointments by train, or drove to them in a horsed cab—some of us walked and that helped to keep us fit!—will understand the contrast between the " naughty nineties " and the " ferocious forties " in which we live to-day. Those who have never known the more leisurely days of the Victorians, at once more gracious and more squalid, cannot fully understand the change; and that in itself is a tribute to the resilience of the human body and the human mind.

But, what shall we do with the two minutes we have saved by our rush and bustle? One answer is that we shall use it to do some more work. That is the very general reply, and the usual practice. In itself, however, it means that leisure when it comes must also be put to good use. " To live remains an art," a philosopher has told us, "an art which everyone must learn and which no one can teach." If science shows us how to bustle, compels us to live at high pressure, and enables us to do so—high pressures being the fashion to-day in chemistry and as in life—it is the arts which show us how to use our leisure. Leisure and contemplation have gone out of fashion, but there is much to be said for using in this way some at least of the two minutes we save by bustling. We recollect words written by Sir James Fraser while he was a professor at Cambridge University: " The windows of my study look on to the tranquil court of an ancient college, where the sundial marks the silent passage of the hours. . . . Here, if anywhere, remote from the tumult and battle of the world, with its pomps and vanities and ambitions, the student may hope to hear the still voice of truth, to penetrate through the little transitory questions of the hour to the realities which abide, while generations come and go." Without a breathing space for contemplation and quiet thought, all our modern speed ends in beating the air. It is fatally easy to be busy and to accomplish nothing.

The holiday season, fully staggered, and augmented by victory celebrations, is upon us. It is incumbent upon us to use our leisure to good effect that we may prepare ourselves for the work of the year that lies ahead. How shall we do it? How shall we answer the question of our Chinese friend, from a civilisation half as old as time? In the true holiday spirit we offer these lines, written by a well-known educationalist of a past generation, Arthur Hugh Sidgwick, killed at Poperinghe in 1917, as one way of smoothing away the mental furrows generated by the speed of modern life:

" On the cabin roof I lie
Gazing into vacancy.
Make no noise and break no jest,
I am peaceful and at rest.

" Somewhere back in days gone by
I did something—was it I?
Do not ask: I have forgot
Whether it was I or not.

" Sometime I may have to do
Something else; but so may you.
Do not argue, but admit
That we need not think of it.

" Thought has ever been my foe;
That is so. Yes, that is so.
On the cabin roof I lie
Gazing into vacancy."

Happy holidays!

NOTES AND COMMENTS

Research in Technical Colleges

LAST week, in a letter to *The Times*, a number of distinguished consultants expressed their misgivings about the wisdom of some of the recommendations made in the Ministry of Education's circular (No. 94, of April 5), the terms of which were discussed in THE CHEMICAL AGE on April 20 (p. 417). They take exception particularly to the suggestion that "any scientist or technologist serving on the staff of a technical college who is competent to act as a consultant to industry should be encouraged to do so," and submit the objection that such a practice would be contrary to the best interests of education. They further claim that the average teacher, however high his academic qualifications, usually lacks sufficient practical knowledge of industry to perform the function indicated. In a later letter to the same journal, however, Sir William Larke gives strong support to the Ministry's recommendation, pointing out that it is the teachers' association with industry which has revolutionised scientific and technical training for industry; the introduction of a new type of study by professors with a knowledge of industrial problems and requirements has been the mainspring of this revolution. There appears little doubt that Sir William Larke's point is more in accordance with modern educational ideas; but there is another side to the matter. It does seem a little unfair that members of the staff of colleges which are directly subsidised by public funds should be encouraged to enter into competition with independent consultants; and from this aspect the affair savours strongly of another attack on private enterprise.

Fuel Technology Education

THE stimulating presidential address delivered by Dr. E. W. Smith at the last annual corporate meeting of the Institute of Fuel has just been circulated, and, as might have been expected, it is found to contain much matter of interest. Not least important is the scheme outlined for the better education of fuel technologists, a matter of some urgency when the state of the fuel supply of this country is as precarious as we all know it to be. As a result of the deliberations of the Institute's Education Committee, and collaboration with the City and Guilds of London Institute, a really sound scheme has been developed by the City and Guilds Institute. Membership examinations were held for the first time under this scheme from May 27 to June 3, for it is essential that a typical series of examination papers should be available to teachers and candidates as soon as possible. Meanwhile, admission to membership is on equivalent qualifications attained at technical schools and colleges, at universities, and through other related professional bodies, together with satisfaction of the "Charter" clauses relating to practical training and experience. This, as Dr. Smith pointed out, is the only possible proceedure until the education scheme of the Institute becomes fully operative, so that practical experience has to be taken as satisfying certain of the requirements, which later will be the subject of specific examinations. Regional Joint Education Committees of the Ministry of Fuel and Power and the Sections of the Institute are also being set up, with the primary function of developing facilities for training in fuel technology for all grades, from the furnaceman to the professional fuel technologist. As industry will be fully represented on these there is every reason to feel that this development is the beginning of a great step forward in technological education in the fuel field.

The Future of Tin Production

CONSIDERATION is now being given by the various tin-producing companies in Malaya to the amount they will need of the promised Government assistance, to help them to rehabilitate their property and equipment damaged during the Japanese occupation. Funds, as has already been announced, are to be made available to them through the Malayan Government for schemes approved by the Ministry of Supply. Interest is to be 3 per cent., but no interest will be payable until 1950. Some companies have already applied for a grant, and re-equipment is proceeding, but it is too early yet to say how many dredges will be capable of operation by August 1. Figures published last December stated that 41 out of 126 were susceptible of repair by that date, provided that spare parts and labour were forthcoming, and it seems likely that this figure is not unduly optimistic. Meanwhile, states the

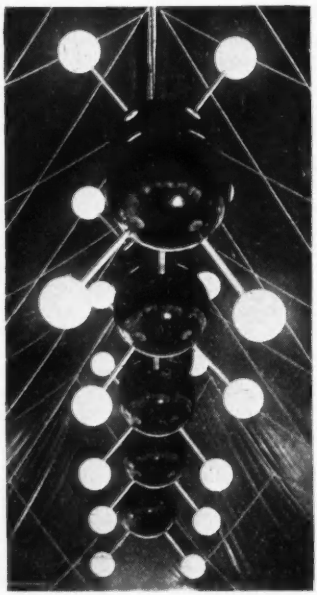
Financial Times, discussions are proceeding between the Government and the Nigerian tin producers on the renewal of the bulk purchase contract which expired last December. The producers have refused to accept renewal at the former price of £300 per ton, and it is understood that the Government has as yet issued no reply.

Research and the Public

THREE-DIMENSIONAL illustration is undoubtedly more vivid to the lay mind than the most graphic writing or the most skilfully reproduced photographs; and the Chemical Research Exhibition, organised by I.C.I., and opened on Wednesday last at the Tea Centre, Lower Regent Street, London, is, among other things, a successful endeavour to bring home to the public—not forgetting our visitors from overseas—the benefits that they owe to modern British chemical research. We have already outlined the nature of the types of research that are illustrated (*see* THE CHEMICAL AGE, May 11, p. 524); now we would comment rather on the actual lay-out of the exhibits. The chief architect of the exhibition is Mr. Basil Spence (who holds the same office for the forthcoming "Britain Can Make It" exhibition), and he has done an excellent job in evolving the general design, and in co-ordinating the work of a brilliant team of young artists. Like Spence himself, these are mostly newly demobilised officers, including John Hutton (a New Zealander, designer of the central mural), James Gardiner (chief designer to "Britain Can Make It"), and Linton Lamb, all of whom were engaged on camouflage work during the war. The distinguished foreign artists, Henrion, of France (for the upstairs rooms), and Rotter, of Czechoslovakia (for downstairs), have added a touch of their special experience.

Chemistry Displayed

GREAT ingenuity in the use of planes of plastic material has been shown in building up the exhibits, and strikingly decorative effects have been attained by the disposition of molecular formulæ in the conventional "ball-and-rod" construction. We were particularly impressed by the "electrolier" composed of a giant version of the symmetrical formula of polythene. Diagrams, transparencies, models, photographs, and cut-outs, not to mention actual examples of laboratory apparatus, and a fair supply of explanatory notices, should serve to bring home to the meanest intelligence that something has been going on here which must have a beneficial effect on human health, food, and clothing. The exhibition has now been opened to the public by Professor Sir Robert Robinson, P.R.S. As the first chemist since Sir Humphry Davy to be elected to the presidency of the Royal Society, Sir Robert is peculiarly fitted to the task of introducing to the public a display of the advances made



The polythene "molecule" at the Chemical Research Exhibition.

by British chemists during the last 15 years—especially as he himself is now engaged in a line of research which it is hoped may lead to the production of synthetic penicillin. Sir Robert was introduced by Sir Wallace Akers, research director of I.C.I., who has just rejoined the company from the Directorate of Tube Alloys, the Government organisation which controlled Britain's war-time research on atomic energy. This combined display of skilful design and chemical ingenuity is a credit to all concerned in it; and, incidentally, is well worth a special visit—you have till June 28.

Electroplating During the War—I

Some Important Applications of the Process

by E. A. OLLARD, A.R.C.S., F.R.I.C., F.Inst.M., and E. B. SMITH

TO the layman, in years before the war, the term electroplating conjured up a picture of gleaming cutlery on a white cloth, cigarette cases, and fittings for home and cars, together with a hundred other ornamental and decorative objects. The demands of war, however, developed for the process of depositing one metal upon another a far sterner application, that of protection against wear and corrosion and the hardening of surfaces to ensure greater service, and it is these latter aspects of electroplating we wish to bring to our readers' notice, since the war-time developments may be applied with far-reaching effect to the products of peace.

Among the uses which have been found for electrodeposition are the protection of steel parts of aircraft, tanks, guns, etc., the special protection of steel against tropical atmosphere, the building up of worn or under-machined parts with nickel or chromium, the facing of bearings with lead to avoid running in, the building up of special bearings by electrodeposition, the stopping-off on parts which have to be hardened so that only the portion requiring hardening is treated, the anodising of aluminium parts for protection, and the plating of electrical components with silver or precious metals to obtain satisfactory properties.

Protection of Steel Parts

Most small machine parts are manufactured of steel, and while they may be used unprotected in places where they are reasonably sheltered from the atmosphere, *e.g.*, in the inside of an engine which is kept well oiled, they will quickly tend to rust and become unserviceable if exposed for any time to outdoor conditions. Thus all steel parts for aeroplanes, tanks, etc., which come into contact with the atmosphere must be satisfactorily protected.

In the early part of the war, aeroplane parts were generally plated with cadmium. Cadmium was chosen in preference to zinc because in the first place it stood up well against humid conditions and, in the second, the finish it gives is generally somewhat more pleasing in appearance; also, it is somewhat easier to plate cadmium, particularly in a barrel, and it has a better "throw" into the more recessed parts of articles. Cadmium, however, is also used as a bearing material, and supplies of cadmium have to be brought across the Atlantic as there are no sources in this country. During the Battle of the Atlantic, several consignments of cadmium were lost and the position became very critical. It therefore became necessary to turn over to zinc all the plating plants which had been using cadmium for the above purposes.

Cadmium is normally plated from a cyanide solution, and zinc can be plated from a very similar solution, although it has been found more satisfactory to use a solution containing a mixture of the double cyanide of sodium and zinc, together with sodium zincate. This solution plates zinc quite satisfactorily, but the conditions of operation are somewhat different from those of cadmium plating and the control of the solution is rather more critical. While a cadmium solution works satisfactorily at room temperature, a zinc solution has to be worked warm. Furthermore, while a cadmium solution may be controlled analytically by the estimation of cadmium and cyanide only, with zinc it is necessary to estimate the metallic content, the total cyanide, and also the caustic present, as these factors have to be correctly balanced. If the solution is properly adjusted, and the temperature and current density are correct, no great difficulty is experienced in the process; but at the same time the zinc does not throw as well as the cadmium, that is to say, it tends to plate on the outstanding portions of the article, and with deeply recessed articles the more remote parts may not cover satisfactorily. Therefore, the solution does not work well on cast iron or on sandblasted surfaces.

Barrel Plating

Even greater difficulty is experienced when articles have to be treated in a plating barrel. A large number of articles to be plated are in the nature of small screws, nuts, bolts, etc., and these are barrelled because it would be impossible to deal with them in any other way economically. It is found, however, in certain cases, particularly with screws having fine threads, that it is extremely difficult to get them to cover satisfactorily. This is due to some extent to the fact that the surface area is greatly increased by the fine thread, and a much higher current must therefore be used. It has thus been found that when such articles are to be barrelled, higher voltages must be used on the barrel than were necessary for cadmium, and this has caused a certain amount of difficulty because often the generating equipment would not supply the voltage required and special generators or rectifiers had to be installed.

Even when suitable voltages were avail-

able, difficulty was often experienced in getting certain small articles to cover satisfactorily. This, however, could be overcome to some extent by either giving the articles a flash of tin before plating or by adding a small quantity of sodium stannate to the solution; and most of the platers dealing with zinc were able ultimately to get satisfactory results on practically every type of article which had previously been cadmium-plated. Towards the end of the war, therefore, cadmium was used scarcely at all and although it is possible that, for some purposes at least, when supplies become normal, it may again have its old application, it is probable that many people who have not got used to the handling of the zinc bath will continue to plate the majority of their articles with zinc since this metal gives quite satisfactory results in practice and is considerably cheaper.

The A.I.D. laid down certain specifications for the plating of aircraft parts. During the war, these specifications were somewhat relaxed because it was felt that the actual time the machine was in service

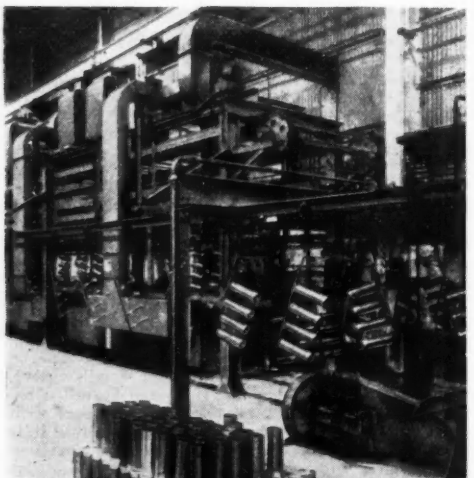


Fig. 1. Fully automatic plant for brass-plating cartridge cases.

was likely to be considerably less than in peace time and therefore it was unnecessary to specify such a high performance. Since the principal essential was to obtain as great a protection as possible, the thickness of 0.0002 in. of zinc was allowed on all components. Towards the end of the war, however, this thickness was raised to 0.0005 in. except in the case of certain articles which are normally barrelled, on which it would be somewhat difficult to obtain an even thickness satisfactorily. Also, if too thick a deposit is made on threaded portions, the nuts will not go on; if they are forced on, they remove the deposit, and the last state is thus worse than the first.

Zinc can also be plated from an acid solution of zinc sulphate and this process is used where very high current densities are required. It can be used satisfactorily on wire sheets, etc., but the solution does not throw as well as cyanide zinc and it is not greatly used except for the purpose mentioned.

Tropical Requirements

In 1944, when the operations in the European theatre were drawing to a close and interest became focussed in the Pacific, the question of the protection of the various components against tropical atmosphere came to the fore. While zinc withstands corrosion of an industrial atmosphere as well as cadmium, if not better, it was found that in damp humid atmospheres the zinc itself was quickly corroded, forming a white corrosion product which was objectionable in connection with electrical apparatus, *e.g.*, radio chassis. It became desirable, therefore, to find some method of treating the zinc-plated parts so that they would withstand the humid Pacific conditions.

It was found that zinc and zinc-plated articles could be "passivated." This process consisted in dipping articles, immediately after plating, in a solution of sodium bichromate and sulphuric acid. This treatment formed on the surface a chromate coating the exact composition of which has not been entirely explained. It seems probable, however, that there are both trivalent and hexavalent chromium in the coating, which is undoubedly hydrated. The coating is probably in the form of some type of a gel. For this reason, a passivated coating must not be heated to too high a temperature; otherwise it will lose its water and crack and become useless. It is standard practice, therefore, after passivating, to dip in cold water and dry in warm air, taking care that the articles do not become overheated. If this process is satisfactorily carried out, an iridescent greenish-yellow film will be formed on the article. The colour of this film may vary considerably with the conditions of formation and it is possible to obtain almost any colour ranging from blue or pink to a darkish brown. It has, however, been found that the dark-brown coatings are not very protective, and the iridescent types of coating are generally preferred.

Zinc-plated articles treated in this manner will withstand tropical temperature and atmosphere very satisfactorily and give a performance quite comparable with that of cadmium. Passivating is quite cheap to apply and, provided it is carefully carried out, it does not give a great deal of trouble. When it was first introduced, however, some difficulty was experienced, since various Government departments insisted that the film should have some definite appearance specified by themselves. This difficulty, however, was gradually cleared up and, with greater experience of the process, producers and inspectors were able to agree.

In addition to the question of protection against corrosion, the war in the tropical countries demanded finishes which would harmonise with the surroundings. Thus it was even necessary to treat a considerable amount of equipment to produce a dark-greenish or khaki finish which did not show against a jungle background. Matt finishes also were generally preferred, since they do not reflect the light. A passivated finish on zinc was often used for this purpose and proved quite successful on many articles of equipment. Other equipment was bronzed or blacked to suit conditions.

Cartridge Cases

Up to the outbreak of war, cartridge cases had been made of brass, but owing to the shortage of non-ferrous metals, it became desirable to make them of steel. The steel cartridge cases had to be protected from rust, and it was therefore necessary to plate them. Zinc was the obvious choice as a plating material, but it was found that for some reason zinc did not work as well as brass in the breach of the gun and tended to jam. Also, the services were used to brass cartridge cases and for this reason alone preferred that they should remain brass in appearance. It was, therefore, ultimately decided to brass-plate the steel cartridge cases.

An enormous number of cartridge cases were required of various sizes and shapes, and for this reason it was desirable to install automatic plant to deal with the output. A careful investigation was, therefore, made on the brass plating process and the conditions under which the brass could be deposited at a high current density were established. A 70/30 per cent. brass was deposited and this could be achieved with a current efficiency of about 65 per cent. Anodes were of the same composition as the brass deposit, namely, 70/30 per cent., and an anode current density of about 40 amp./sq. ft. could be used. The automatic plant had a plating vat of 2500 gallons capacity and used 4000 amps., 6 g. of brass being deposited per sq. ft. of surface. After plating, the articles were given a dip in dichromate to give a passivated surface somewhat similar to that described for zinc, although in the case of brass the colour change is very slight.

One of the problems when dealing with an article such as a cartridge case in an automatic plant is that the inside must be drained out between operations. The plant is arranged to lift and transfer the articles from one tank to another and this is done by means of a set mechanism. The articles themselves are held on special jigs. When the transfer has been made by hand, the operator tips the cartridge case to empty it before transferring it from the vat to the swill or *vice versa*. This operation must therefore be conducted by the automatic plant and this was achieved by the design of a special jig. The position of the lift of this jig was somewhat different from that in which it hung when suspended in the tank. Thus, when hanging in the tank, the cartridge cases were tilted slightly with their mouth upwards so that the air could come out of them, and thus they were completely filled with solution. When lifted, however, the position of lift was altered and centred over the closed end of the cartridge case so that they hung mouth downwards and the solution drained out of them.

The plant illustrated in Fig. 1 worked for some years and very little trouble was experienced with it. The cartridge cases plated were in every way satisfactory and since under war-time conditions they did not have to be stored for any long period, the specified thickness of .0003 in. gave satisfactory protection. The plant dealt with some 600 sq. ft. of surface per hour.

Building Up Machine Parts

So far we have dealt with the problems of protection against corrosion. Electrodeposition, however, can be used for producing hard surfaces on wearing parts and also to bring these parts up to size.

In war time particularly, where it is necessary to conserve all material, it is desirable to be able to reclaim a machine part which has been badly worn or which, owing to inexperienced labour, has been machined below size. Often it is only one small portion of the whole component that has to be brought up to size and this makes it even more economically desirable to treat the part so that it may be put back into service. Nickel is the material most generally used for this purpose and although supplies of nickel were somewhat short during the war, allocations were available for such uses. It is possible to build up a deposit of nickel to almost any desired thickness by taking suitable precautions to ensure its adhesion, and satisfactory hardness and mechanical properties.

When a part has to be built up it is first cleaned by any of the standard methods and then stopped off so that only the portion to

be treated is exposed to the solution. This stopping-off process is usually accomplished by dipping the article concerned into a bath of wax. The parts of the article on which the deposit is required are first coated with a mixture of glycerine and chalk or some other suitable substance so that the wax does not adhere to them, and the whole article is then dipped in the wax. The edges of the treated portion are then cut round with a knife and the wax stripped away from those portions, after which the whole article is again cleaned by some suitable method and then given an anodic etch in sulphuric acid. After thorough swilling,

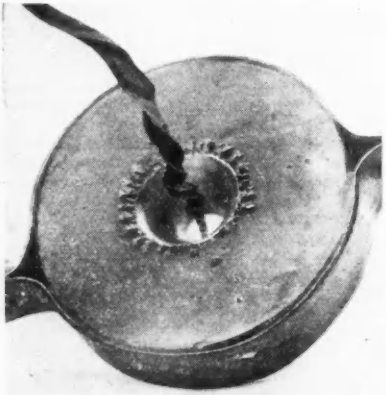


Fig. 2. Steel die faced with chromium through centre, showing central anode twisted into a spiral to increase surface area.

the parts are transferred to the nickel solution and a heavy coating of nickel built up. From time to time the parts may be measured by means of calipers until it has been ascertained that the deposit is of the required thickness, after which they are removed from the depositing vat, swilled and dried, and the wax is melted off in a warm oven. The deposit may then be machined to the correct size and the part is ready to be put back into service. This process has been worked on a commercial basis since the war of 1914-18, but during the last war, the need for it was greatly increased; a number of firms who had previously only undertaken ordinary plating work adopted this process and were able to salvage a large number of components which would otherwise have had to be scrapped.

Where a steel part has to be built up with 0.0001 in. or more of metal, nickel is usually found to be the most satisfactory material to use; parts so built up wore extremely well in service, it being generally found that even in non-lubricated conditions the part will wear as well as a case-hardened steel surface, if not better. For certain purposes, however, it is desirable to have an extremely hard surface, and in this case chromium is used. Chromium has not only a very hard surface but also a low coefficient of friction, so that it has been found that if a steel part rubs against a chromium surface not only does the chromium surface itself withstand the wear; but the steel is found to last longer than when rubbing on the surface of other metals. Thus, if a bore of a cylinder is faced with a chromium coating, the steel piston rings last longer than they would in a cast-iron cylinder, and the engine itself gives a better performance. Chromium has therefore been used not only for building up parts that are rather below size, but also for treating new parts to prolong their life. Cylinder bores, crankshaft journals, parts subjected to wear, and even the internal bores of machine guns have been satisfactorily treated with a chromium deposit, and this has resulted in increased wear and longer life.

Chromium can be deposited from a solution of chromic acid containing a small amount of sulphate and thus this type of solution which is used normally for producing decorative finishes can be used quite satisfactorily for plating heavy deposits. The building up of thick deposits, however, requires a certain amount of technique and the set up of the article in the plating vat is of the greatest importance. Chromium does not throw well, and therefore it will often be found necessary to arrange small anodes round the parts to be plated, while in the case of internal bores a central anode is required, which must be correctly registered in the centre of the bore (Fig. 2). The success of the operation depends on the satisfactory stopping off and setting up of the part and the stabilising of all the deposition conditions, *e.g.*, temperature, current density, and solution composition.

Lubrication of Surfaces

Where a chromium surface has to run under lubricated conditions, it is necessary to find out whether it will take and hold a film of lubrication. A smooth, highly-polished chromium surface does not hold oil well and if such a surface is made on a component such as a cylinder bore, the oil film does not remain on it and the surface will often become scored (Fig. 3). To obviate this trouble it is usual to produce a deposit which is full of very fine cracks, since these serve as oil channels and ensure the maintenance of a film of lubrication. Such deposits may sometimes be made directly, but it is more usual to produce the required surface by back-etching the deposit after deposition. For some reason, not fully explained, when

a chromium deposit is etched it will usually etch in the form of a number of fine cracks which run evenly over the surface and ensure satisfactory lubrication. In some cases a surface of this type can be produced mechanically.

While for certain purposes, such as cylinder bores, it is desirable to have a very hard surface, for the bearings of crankshafts and similar parts it has been found that a lead surface is satisfactory. The ordinary lead-bronze bearing requires to be carefully fitted and run in over a long period before the engine can be put into service. If, however, this bearing surface is faced with about 0.0002 in. of lead it will be found that the running-in period can be dispensed with and that the bearing itself will last much longer and give a far better service (Figs. 4 and 5). Careful investigation has shown that a good deal of what was previously considered to be bearing wear is really caused by corrosion of the bearing surface by the lubrication. In point of fact, the two metal surfaces should never come into contact and if a satisfactory film of lubricant is maintained, in theory, there should be no abrasive wear at all. In practice, it has been found that the lead surface, being somewhat porous by nature, tends to maintain a film of lubricant in the bearing and at the same time resists corrosion by the lubricant. This resistance can be materially increased by infusing into

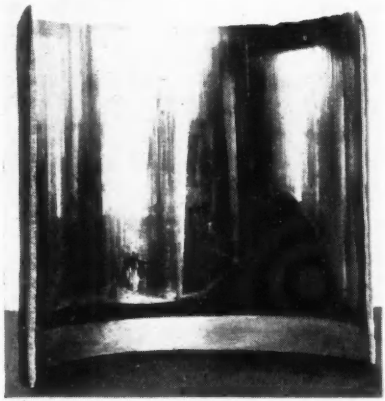


Fig. 3. Section of the inside of a motor-bus cylinder, showing scoring of the chromium coating due to the fact that this was of a non-porous nature and did not retain the oil layer.

the lead a small amount of indium or tin. The lead film is first deposited on the bearing from a fluoborate bath, after which a small amount of indium or tin is applied to the surface; the whole bearing is then heated at 180° C. for about one hour, under which conditions the tin or indium alloys

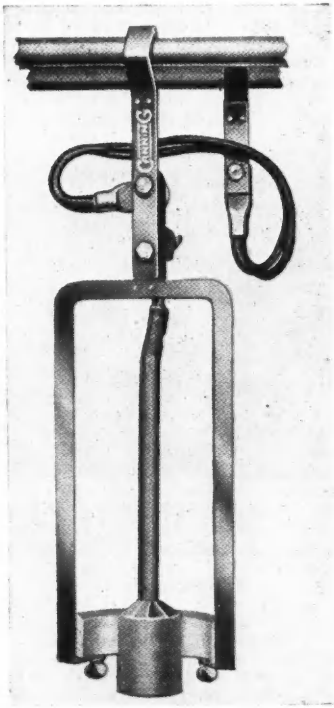


Fig. 4. Bearing set up in special vat, with anode ready for deposition.

with the lead. This alloy resists corrosion by most of the organic acids and other material found in lubricating oil, and a bearing so formed gives extremely long life. When the lead deposit itself becomes worn or corroded it can be removed and a fresh deposit made on the original bearing, so that it is possible by this means to prolong the life of the bearing almost indefinitely. Bearings of this type have been used in high-duty engines, and in fact are almost essential in the modern types of aeroplane engine.

Investigation of the conditions under which bearings operate have, as mentioned above, shown that there is little actual wear. For high-duty bearings, however, it is necessary that the bearing metal should have a high heat conductance so as to remove the heat formed on the surface, as this might

otherwise vaporise the lubricant and cause the bearing to seize. For this purpose, silver, which has the highest heat conductance of any metal, would appear to be the ideal, and it has been found in practice that bearings built up with 0.03 in. of silver on steel shells will give very satisfactory performance provided they are coated with lead in the manner described above. Such bearings can be easily built up by deposition, the ordinary type of silver cyanide bath being used, but since fairly thick deposits have to be made in a limited time, it is usual to employ a bath containing a high silver concentration and a certain amount of free caustic, and to work it warm. If the bath is worked at about 30° C. and agitated by rotating the anode or by some other convenient method, high current densities can be employed and the deposit required built up in some 6 to 8 hours. Such processes have been used for the production of silver bearings, and these bearings have given highly satisfactory results in service. While at the present moment their application appears to be chiefly confined to the aero engine, it is quite possible that such bearings may be more generally employed in the future.

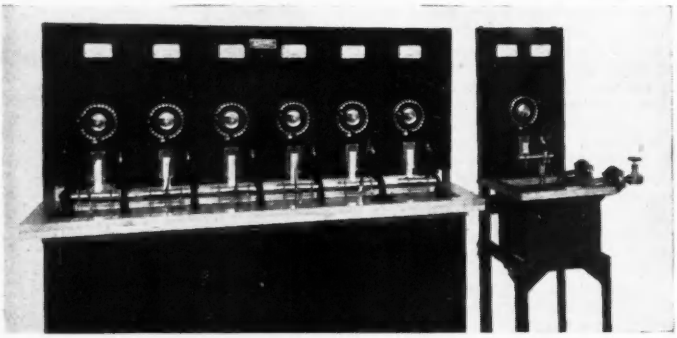


Fig. 5. Deposition plant for lead-plating bearings.

Indium Infusion

One of the bugbears in high-duty internal-combustion engines is that organic acid complexes are formed by the oxidation of the oil. These acids do attack some parts of the engine and if copper is dissolved the resulting compounds may engender a vicious attack on steel parts. Bronze gears have been successfully protected against the attack by a treatment with indium. The gears are plated with indium and then heat-treated in a bath of oil. The indium is thus diffused into the surface and protects it against this oil attack. Another feature is that, although indium is so soft in itself that it can be cut with a finger-nail, it hardens the surface of the gear and reduces wear. A similar treatment of press dies is claimed to give them a longer life, thanks to the hardening influence and the lubricating properties of indium. It is claimed that despite the cost of indium plating, the saving makes the treatment economic.

Tin Plating

In high-duty engines the leading edges of gears are frequently damaged by "scuffing," and are often scrapped for this reason. This trouble can be mitigated by tinplating the teeth. The gear is etched with sulphuric acid and then coated with about 0.0003 in. of electrodeposited tin. The gear is then annealed at 200° C. for two hours. Before use the gear is examined with a magnetic crack-detector. This is necessary as stresses are often set up in the gear teeth through faulty heat-treatment and more often by faulty grinding. The etch will expose them by causing cracks if the stresses are of a dangerous nature.

(To be continued)

Admirably illustrated and containing a wealth of useful data, the *Prolite Die Maintenance Manual* for 1946, published by Protolite, Ltd., Central House, Upper Woburn Place, London, W.C.1, explains how successful use can be made of "Prolite" cemented tungsten carbide dies and tools in a wide variety of manufacturing processes and in engineering.

A description of the fundamental principles of infra-red radiation, as applied to an entirely new method of distilling or evaporating liquids and drying solids, appears in *Infra-Red Evaporators and Driers*, published by Kestner Evaporator and Engineering Co., Ltd., 5 Grosvenor Gardens, S.W.1. Particulars are given of laboratory units for development and small-scale production.

South African Chemical Notes

Review of Most Recent Developments

(from Our Cape Town Correspondent)

NATAL is to have a cement factory with a minimum capacity of 75,000 tons a year as a result of the ratification in March by shareholders of the Natal Portland Cement Co., Ltd., of the provisional agreement between their company and the New Durban Roodepoort Gold Mining Co. This agreement provides for the erection of the factory within two years.

When the foundation stone of the new plant of Everite, Ltd., manufacturers of asbestos cement products, Brackenfel, Cape, was laid in February, the managing director announced that the factory would start production in about four months. The chairman said that the factory was the second to be established by the company in the Union. Both had been made possible by the co-operation between South Africans, Englishmen, and Swiss, who between them had contributed manpower, raw materials, specialised machinery and technical knowledge. The new factory would increase its output and so assist in relieving the acute shortage of materials required for large-scale housing programmes. The company was established in August, 1941, and now the Klipriver factory was employing about 700 workers. The Brackenfel factory, which would start with 300 employees, had been designed to allow for considerable expansion and it was hoped to make rapid progress there.

Atlas Paints and Compositions have moved to their new factory in Chamberlain Road, Jacobs, Natal, and have also acquired four acres of ground adjoining the works. New paint-making plant, worth £10,000, will be arriving shortly from England. Considerble improvement is being maintained in the supply of raw materials from England and the United States for the South African paint industry generally. Given the benefit of skilled technicians, machinery, labour, etc., and with a knowledge of local conditions, it is being insisted that the South African paint industry could produce paints and compositions at least equal to the imported product.

Results of DDT Spray

The sprayings of DDT from aircraft in the Mkuzi game reserve in Zululand, to eradicate tsetse fly, have given promising results, and the experiments will be continued. Three sprayings were completed in January, and the Department of Agriculture intended to begin a fourth soon, but copious rains have created conditions unsuitable for the use of DDT, which is most effective when the grass is not long and there is not much foliage. The department has therefore decided to postpone the fourth spraying until winter.

It is pointed out that if insects are killed indiscriminately it would inevitably upset the balance of insects and plant life. It would also create undesirable changes in the plant world, in the fertilisation or destruction of which insects play so large a part. The effect it would have on the malaria-carrying mosquito is very important. If it is successful it would mean the opening up of the country to farming, for what is the use of safeguarding the cattle if farmers are in continual danger from malaria? Various traps were installed in fixed spaces, some of them light traps for night work. The insects caught in the traps are sent to the laboratory in sealed glass containers, the produce of each trap labelled separately with the date, wind conditions, etc. In the laboratory the insects are identified and counted. One tube may contain 7000 insects, some of them microscopic. The insect mortality following the spraying was colossal. Bees do not appear to be affected, nor do butterflies and moths, although some types of caterpillar were killed. Large numbers of houseflies and blowflies were destroyed, and after the spraying none of these were seen alive. It appears certain that the mosquito is susceptible to DDT in both larvæ and adult stages.

South African gelatine manufacturers have applied for tariff protection on the grounds that the industry is seriously threatened by oversea competition. It is stated that as the country's annual requirements in tonnage are extremely low, a single consignment of gelatine from abroad could seriously affect the local industry.

Protein Factory for Durban

It is likely that a £50,000 factory will be established in Durban to make hydrolysed protein on a big scale. This protein has given encouraging results in the treatment of such diseases as tuberculosis. The Industrial Development Corporation may assist the company with capital for machinery and buildings, provided private enterprise actually undertakes the production on a large scale. So far products from a pilot plant have been used and these results showed that 8 out of 10 cases of pulmonary tuberculosis that were losing weight improved in that respect and in general condition when this protein was used. The protein can also be used for the treatment of diseases like diabetes, ulcers, gastro-enteritis and dropsy and kidney complaints. It is made from beef and whale meat.

Plant Manufacturers' Association

Annual Luncheon and Meeting

Mr. Keith Fraser.

THE annual luncheon of the British Chemical Plant Manufacturers' Association was held on May 29 at the Connaught Rooms, Great Queen Street, London, W.C.2. Mr. Keith Fraser, the retiring chairman of the Association, presided over a company of more than 200, the principal guest being Mr. Hugh Gaitskell, M.P., Parliamentary Secretary to the Ministry of Fuel and Power.

Other guests included: Sir Wavell Wakefield, M.P., deputy chairman of the Parliamentary and Scientific Committee; Sir John H. Woods, permanent secretary of the Board of Trade; Mr. Clement Jones, chairman of the technical sub-committee of Lord Hankey's Committee; Sir Guy Nott-Bower, deputy secretary to the Ministry of Fuel; Sir Clive Baillieu (president) and Sir Norman Kipping (director-general), of the Federation of British Industries; Mr. E. H. Gilpin, chairman of the Food Machinery Industrial and Export Group; Mr. I. I. Soloviev, of the U.S.S.R. Trade Delegation in the U.K.; Mr. Hugh Griffiths (president) and Mr. M. B. Donald and Mr. L. O. Newton (joint hon. secretaries), of the Institution of Chemical Engineers; Mr. C. F. Merriam (president), Mr. R. Duncalfe and Dr. P. C. C. Isherwood (vice-presidents), Mr. L. P. O'Brien (chairman) and Mr. J. Davidson Pratt (director), of the Association of British Chemical Manufacturers; Col. C. M. Croft, president of the Institution of Gas Engineers; Lt.-Col. H. B. Riggall (president) and Mr. C. K. F. Hague (vice-president), of the British Engineers' Association; Dr. E. W. Smith, president of the Institute of Fuel; Sir William Palmer, chairman of the British Rayon Federation; Lt.-Col. S. M. J. Auld, past-president of the Institute of Petroleum; Mr. F. C. Fitzpatrick, of the Amalgamated Engineering Union; Sir Wallace Akers, Sir Frederick Bain and Sir Ewart Smith, of I.C.I., Ltd.; Professor D. M. Newitt, Professor of Chemical Engineering, Imperial College; and the Rev. P. B. Clayton, founder padre of Toc H., who said grace. In addition to those mentioned, representatives of the Foreign Office, the India Office, the Board of Trade, the Ministry of Supply, the Ministry of Fuel and the Ministry of Labour were also present.

After the loyal toast, there was only one other, that of "His Majesty's Ministers." This was proposed in a few words by the chairman, who said they were extremely fortunate in that Mr. Gaitskell had been kind enough to come along at short notice to reply to the toast. By nature, Mr. Gaitskell was an economist and a kind man, but by training a Minister. His maiden speech in the House, on the American loan, had created a sensation.

Fuel Economy

In his reply, Mr. Gaitskell spoke chiefly of the production and use of coal. Up to now, he said, coal had been a cheap product, and in the terms of human lives perhaps too cheap. That was all the more reason why coal should not be used in a wasteful manner. With the co-operation of industry, the Ministry of Fuel had devoted a great deal of attention to this subject in the past two or three years. There were three reasons why coal was sometimes not used as efficiently as it might be. These were: (1) sheer carelessness; (2) small inefficiencies which could be corrected by better maintenance and operation of existing plant; and (3) because plant constructed to burn coal was not designed in the most efficient manner. A coal rationing scheme was prepared during the war, but one of the major reasons it was never put into operation was that substantial economies were effected by industrialists who used coal. About 15 million tons a year were saved in that way and he believed that by more careful attention to the problem and by further use of the services offered by the Ministry, a further 20 million tons a year could be saved. He asked his hearers, as important users of coal, to make contact with the Ministry experts in their area to make sure that they were making the best use of coal. By improvements in plant design and by improving works integration of heat-consuming plant, it was considered that a further 25 million tons of fuel a year could be saved. Such a target might not be attainable at the moment, but in the next three or four years it should not be out of the question.

Mr. Gaitskell went on to congratulate the members of the Association on "doing so wonderfully in the export world." Exports of machinery were going up, and he had no doubt they would continue to go up. Sir Frederick Bain, who was sitting next to him, might think it was not a good thing that they should export machinery to help other countries to compete with I.C.I., but he did not seem unduly worried about it! However, they did not control the economic policies of other countries and could not dictate how they were to conduct their economic affairs. Other countries could not be stopped from building up their own industries and if manufacturers here refused to supply the equipment, then it could be obtained elsewhere. Actually, the export of machinery was not the end of the matter; it was the beginning of an important commercial contact. Provided the equipment was of good quality, and satisfactory, there should be continuing orders for replacement, extensions and spare parts. Moreover, such equipment might be used to produce goods at a lower cost than would be possible in this country, but that did not mean that uneconomic production elsewhere should be encouraged. Their aims could be achieved, not by refusing to export equipment, but rather by securing the adoption of commercial policies by all countries, which would produce the optimum degree of specialisation and consequently a generally higher standard of living for the world.

Building Up Goodwill

There was, at the moment, relatively little competition in the export world from America, who was primarily absorbed by problems of satisfying her own home market, but that state of affairs could not be expected to continue indefinitely. In their export policy, they should not look for quick profits, but should seek to establish permanent contacts and the building up of goodwill that would stand them in good stead when competition became more acute. Speaking, in conclusion, of the transition from war to peace, Mr. Gaitskell said that when all was said and done this had been taking place with extraordinary smoothness and witth relatively little unemployment. For those reasons he looked with confidence to the future. In this country there were, perhaps, the finest scientists and research workers in the world; a great fund of enterprise; and, above all, the inestimable benefit of a sound, sensible, rational attitude on the part of the common people.

The chairman thanked Mr. Gaitskell for his kindness in coming to the luncheon. Alluding to Mr. Gaitskell's references to exports, he mentioned the visits to India and South Africa of the Association's director, Mr. Norman Neville, who was able to obtain valuable information about export markets and in whose absence their secretary, Dr. E. H. T. Hoblyn, had carried on magnificently. The chairman spoke of the Association's happy relations with the Gov-

Mr. Norman Neville.

ernment departments with which it was concerned and said that of great importance to the industrial life of this country was the unofficial linking-up that was going on between plant manufacturers and consumers. Results had been achieved, among them the institution of one-year courses, aimed at helping to make up the shortage of chemical engineers. The splitting of attention between home markets and exports was a matter which required the most careful consideration. It was natural and reasonable that home markets should be allowed to benefit from the latest developments in machinery; indeed, foreign markets, such as India, appeared to prefer types of machinery already in use. The goodwill so carefully built up between suppliers and consumers during the war was all the more necessary in peace-time. Confidential discussions had gone on that left him with the conviction that the goodwill was still there and would continue.

Private enterprise in this country, the chairman continued, was organised in trade associations and there was not a great deal of time to waste if they were to co-ordinate the functions of those associations. Private enterprise had to show this country that it was an efficient way of running the country's industry. "I believe that some of us will have to sacrifice a certain amount of popularity rather than that industry should be regarded as paunched and cautious," declared Mr. Fraser. "Somehow, men of wider human sympathies will have to be employed as negotiators between the Government, industry and consumers."

The luncheon was followed by the annual general meeting, Mr. Fraser again presiding.

The annual report stated that during the

year ended March 31 last, the Association had been responsible for arranging for 21 representatives of member firms to visit Germany to investigate and report on more than 100 chemical engineering targets. Notable among these investigations was the detailed survey of the Metallgesellschaft A.G. and the Lurgi Group of chemical engineering companies by Mr. W. R. Beswick and Mr. Norman C. Fraser, who were to be congratulated on their monumental report. At the invitation of the Association of British Chemical Manufacturers, three members of the B.C.P.M.A. joined three A.B.C.M. teams who investigated various aspects of the German chemical industry. Further B.C.P.M.A. teams would be visiting Germany this year. The reports that were being made available as a result of the investigations mentioned would be built up into a library, properly cross-indexed, and would be available to members. Towards the end of 1945, Mr. W. J. Hooton and Mr. B. N. Reavell visited Germany to report on the reparations position as it affected members of the Association, and certain claims had now been filed.

Members were contributing in full measure to the effort required to achieve the increase in exports necessitated by the national balance of payment position. The present spate of export orders, however, was not necessarily evidence of a continuing market. Mindful of the possibility of taking advantage of the present position to develop long-term business, the executive committee delegated the director, Mr. Norman Neville, to visit India and South Africa during the period under review. It was hoped eventually to establish a branch of the Association in India, but there seemed no immediate call to open an office in South Africa.

The Publicity Sub-committee had approved a draft format for the new Association directory, which it was hoped to publish early in 1947.

The New Council

MR. W. R. BESWICK (Ashmore, Benson, Pease & Co., Ltd.) was elected chairman and it was decided to have three vice-chairmen instead of one, as hitherto, the following gentlemen being elected: MAJOR V. F. GLOAG (Simon Carves, Ltd.), MR. A. G. GRANT (Whessoe, Ltd.), and MR. B. N. REAVELL (The Kestner Evaporator and Engineering Co., Ltd.). MR. H. V. YORKE (Bennett Sons & Shears, Ltd.), was elected hon. treasurer. Instead of an executive committee, it was decided to have a council, to which the following were elected: Mr. G. W. Allott (Newton Chambers and Co., Ltd.), Mr. H. S. Cheetham (Humphreys & Glasgow, Ltd.), Mr. E. S. Franklin (Torrance & Sons, Ltd.), Mr. J. C. Haithwaite (John Thompson (Dudley), Ltd.), Mr. G. N. Hodson (Hathernware, Ltd.), Mr. W. J. Hooton (S. H. Johnson & Co., Ltd.), Mr. S. J. Ralph (Aluminium Plant and Vessel Co., Ltd.), Mr. G. W. Riley (George Scott & Sons (London), Ltd.), Dr. E. C. R. Spooner (Sutcliffe Speakman & Co., Ltd.), Mr. S. G. Watson (W. C. Holmes & Co., Ltd.), Mr. W. Wood (International Electrolytic Plant Co., Ltd.), and the following past chairmen, who serve *ex officio*: Mr. B. L. Broadbent (Thos. Broadbent & Sons, Ltd.), Dr. G. E. Foxwell (Clayton Son & Co., Ltd.), Mr. Keith Fraser (W. J. Fraser & Co., Ltd.), Mr. J. H. G. Monypenny (Brown Bayley's Steel Works, Ltd.), Mr. J. Arthur Reavell (The Kestner Evaporator and Engineering Co., Ltd.), Dr. R. Seligman (Aluminium Plant and Vessel Co., Ltd.), and Mr. J. W. Wright (Cannon Iron Foundries, Ltd.).

Non-Ferrous Metals

U.K. Consumption Figures

THE Directorate of Non-Ferrous Metals has issued detailed figures of the consumption of non-ferrous metals in the U.K. during the first quarter of 1946. The figures given below are in long tons.

Zinc: New, 50,653 (high grade, 22,602; low grade, 28,051). Scrap (including remelted), 16,092. Total, 66,745.

Lead: Imported and lead bullion, 55,426. Scrap (including lead refined in the U.K. from scrap and home-produced ores), 25,285. Total, 80,711.

Tin: Virgin, 5421. In scrap, 2107. Total, 7528.

Nickel: Virgin, 2098.

Cadmium: 127.

Antimony: 1490 (excluding 648 in scrap).

Cobalt: 149.

Manganese: 136.

S.C.I. MEETING

The provisional programme for the annual meeting, etc., in London, of the Society of Chemical Industry is as follows:

July 11. 11 a.m., meeting of chairmen and hon. secretaries of sections and groups in the rooms of the Geological Society, Burlington House, Piccadilly, W.1; 12.30 p.m., Council luncheon, Stewart's Restaurant, 50 Old Bond Street, W.1; 2.15 p.m., Council meeting in the rooms of the Geological Society; 8 p.m., "at home," by invitation of the London section at Connaught Rooms, Great Queen Street, W.C.2.

July 12 (at Connaught Rooms). 10.30 a.m., business; 11.30 a.m., president's address; 12.30 p.m. for 1 p.m., luncheon; 3 p.m., presentation of the Messel Medal to Dr. Wallace P. Cohoe.

Analysis of Tall Oil

Summary of a Simple Method

A COMPLETE analysis of tall oil requires much time and work as well as much experience and skill. For this reason a simple method of analysis is much wanted for the control of operation and deliveries. Such a method, as approved by the Analysis Committee of the Central Laboratory of the Cellulose Industry, Sweden,* is described herewith.

According to this combined method the water content of tall oil is determined by means of distillation with xylene; the ash content is obtained by evaporation in a platinum, quartz or porcelain dish and ignition in a furnace at 700°C. Water-soluble acids are titrated in an aqueous solution obtained by shaking equal parts of tall oil and water at 80°C. Cresol red is used as indicator.

Acid number and saponification value are calculated as mg. KOH per gram tall oil, considered as dry substance, on the basis of a titration with alcoholic potassium hydroxide using α naphthol-phthalein as indicator. Unsaponifiable matter is determined after saponification of the oil by boiling with alcoholic KOH for 45 minutes and extracting by shaking with petroleum ether.

Estimating Resin Content

The resinous content is obtained as follows: easily esterified acids are esterified and the acids formed are removed by washing with salt solution. The mixture of resinous acids and esters, which is taken up by the ether, is titrated with alcoholic KOH using α-naphthol-phthalein as indicator.

For numerical calculation, the acid number is assumed to be 186. After the titration the soaps of the resinous acids are extracted by shaking with water and the resulting solution of purified esters is distilled to remove the ether. The ester fraction is saponified by boiling for 45 minutes with alcoholic KOH of a known concentration and the excess lye is titrated back with hydrochloric acid, again using α-naphthol-phthalein as indicator. When calculating the content of fatty acids and other easily esterifiable acids, a saponification number of 200 should be used.

The analysis of distilled oil is carried out according to methods similar to those used for crude tall oil. Since distilled oil does not contain acids insoluble in petroleum ether, the content of fatty acids may be obtained by difference. In addition, the specific gravity, the refractive index and the viscosity should be determined.

An accurate analysis of tall oil, wood extract, etc., requires a determination of the content of acids insoluble in petroleum ether. It is also necessary to determine the content of resinous and fatty acids in the fraction of oil obtained when the unsaponifiable matter and the acids insoluble in petroleum ether have been removed. When using a combined method as indicated it is suitable to determine the water and ash content as well as the water-soluble acids and the unsaponifiable matter as described above.

The soap solution obtained after the extraction of the unsaponifiable matter with petroleum ether is evaporated to a small volume, acidified, and then extracted by shaking with petroleum ether. The ether-insoluble fraction is dissolved in alcohol and evaporated to dryness in a weighed platinum dish. The loss in weight on ignition is reported as the content of acids insoluble in petroleum ether

Calculation of Acid Number

The petroleum ether is removed from the soluble oil fraction by evaporation. The fatty acids are esterified and, after adding ether, the acids formed removed by washing with salt solution. The resinous acids are neutralised by titration with alcoholic KOH. The resinous soaps formed are extracted by shaking with water. The resinous acids are once again liberated by adding acid, taken up in ether, and determined gravimetrically. The acid number of the resinous acids is calculated from the consumption of KOH for neutralisation and the amount found gravimetrically.

When the resinous soaps have been extracted by shaking with water the fatty acid esters remain in the ether solution. The ether is removed by distillation and the solution is saponified by boiling with alcoholic KOH for 45 minutes. The excess of potassium lye is titrated back with hydrochloric acid. The solution is acidified and the fatty acids are determined gravimetrically in the same manner as used for the resinous acids. The saponification number is calculated from the result of the titration and the amount of fatty acid found gravimetrically.

An appendix describes a method for the determination of unsaponifiable matter by means of ethyl ether as well as a Finnish method for the determination of acids insoluble in petroleum ether directly on the original sample of tall oil. The rapid method of Hastings and Pollak for the determination of resinous acids by direct titration on the esterified sample is also discussed.

* Technical Communication CCA 15, of the Swedish Association of Pulp and Paper Engineers (*Svensk Papperstidning*, March, 1946, p. 105.)

A CHEMIST'S BOOKSHELF

THE CHEMICAL PROCESS INDUSTRIES. By Professor R. Norris Shreve. London and New York: McGraw-Hill. Pp. 957. 45s. ($7.50 in U.S.A.).

This book is written by a teacher of chemical engineering to present a picture of the American chemical industry to students. It aims at giving "a cross-section of the manufacturing procedures employed by modern chemical industries, largely separated into their unit processes and unit operations through the help of flow charts." The presentation aims at dealing with the chemistry of the processes, with the energy changes in both physical and chemical operations, and in many cases the American production figures and the dollar value are quoted. It is doubtful how far these aims are in fact generally achieved.

The book is primarily a description of the processes employed in America with flow sheets of the several operations. It is a pity that these flow sheets are on a very small scale, because to make them intelligible the student must redraw them for himself; but perhaps that is the reason for using drawings that often require the aid of a reading glass on the part of older readers. It is, of course, impossible to give much more than a survey telling the reader the general scope of the processes used when the whole field of chemical industry is covered in less than 1000 pages.

There are, of course, flaws in a book of this character. It would be surprising if there were not. The expert in many industries will find something omitted, something not adequately covered, something not quite representative of modern processes. Taking some pages at random, it may be noted that whereas quite a reasonable account is given of the channel black process, the newer thermal processes which are now equally important are dismissed with the barest mention. The description of the Koppers-Becker coke oven appears to be in fact a description of the Koppers oven, and any student who can make head or tail of the drawing showing the flow of air and gas in this oven deserves to be given his degree right away. The reason for the burning technique in making silica and other bricks is not made clear, since no phase diagram is given of the silica minerals.

These, however, are specimens of a few almost inevitable blemishes, for no book is perfect. The descriptions go more deeply into the chemical engineering of processes than is usual in a descriptive work of this character. To that extent this book will be valuable as a guide to the student and as a work of reference to the chemical engineer who wishes to have available general information on manufacturing processes. As an example of a small manufacture, sodium silicate might be taken. We are told something of the compounds that go to make up commercial sodium silicate and their uses; a flow sheet is given of the method of manufacture together with the quantities of material needed; the manufacture is briefly described. The larger and more important manufactures such as the nitrogen industries or petroleum are given much more detailed treatment. No detailed descriptions of apparatus are given for any of the processes. It is readily admitted that a far larger book would be needed to do this, but without it the picture is incomplete, since the flow sheets are simply diagrams of the passage of materials through the plant.

The teaching of chemical engineering is represented as being based on unit operations (involving physical change) and unit processes (involving chemical change) and the more important manufactures are divided up in this way. For major manufactures the flow sheets are divided up into a number of these unit processes or operations, and presumably the student would be taught the chemical engineering of these individually, and would be expected then to apply them to the several industries. An interesting book and one well worth a place on the bookshelf, particularly to those who wish to know what is being done in the U.S.A.

G. E. FOXWELL.

THE CHEMICAL FORMULARY, Vol. 7. Editor-in-Chief, H. Bennett. Brooklyn, N.Y.: Chemical Publishing Co. Pp. 474. $6.

CUMULATIVE INDEX FOR VOLS. 1-6 OF THE CHEMICAL FORMULARY (Editor and Publisher as above). Pp. 164. $4.

Owing to the vicissitudes of war, the sixth volume of this remarkable series never reached us, and we shall have to be content with the references to that volume in the useful cumulative index (published in 1944), a welcome acquisition, which appears simple, accurate and full. The seventh volume well maintains the standard of its predecessors, and is conveniently divided under the customary headings. The section on textiles and fibres appears particularly useful on this occasion, and it is good to see that the list of "Trade-Name Chemicals" is maintained. If it were necessary to make this admirable compendium yet more useful to the manufacturing chemist, it might be suggested that references should be made to an even wider selection of journals. What an amazing variety of knowledge is contained within these pages: from the manufacture of various types of German sausage to the preparation of water-insoluble adhesives with modern types of synthetic rubber seems a far cry. Yet here it all is, with a convenient index to disentangle it.

Alleged Monopoly

Statement for Canadian Company

REFERENCE was made in THE CHEMICAL AGE on May 25 last (*see* p. 586) to the institution of proceedings in New York against the International Nickel Company of Canada, Ltd., its American subsidiary (the International Nickel Co., Inc.), and three of its offices, alleging a monopoly in restraint of trade and the preservation of the monopoly by cartel agreements with German and French concerns.

We are now informed that on May 16, Mr. R. L. Beattie, vice-president and general manager of the International Nickel Company of Canada, Ltd., issued a statement to the Press of Canada and the U.S. as follows:

"In connection with civil anti-trust proceedings against the company announced by the U.S. Department of Justice and being instituted in the Federal Court in New York to-day, we have not been served with a complaint in the proceedings against the company, but from the reports we have it appears that the U.S. Department of Justice is attempting to deprive the International Nickel Company of Canada, Ltd., of its U.S. subsidiary. The complaint seems to be that because the nickel we mine in the Dominion is purchased by a large percentage of U.S. nickel users, our company is to be classed as a monopoly illegal under U.S. law. Our nickel is in active competition with the production of other producers, including that of the U.S. Government itself from the Cuban deposits, and also it is in competition with many other alloying elements. The prices we have charged in the U.S. have been so low as to require the U.S. Government to give, during the war, substantial subsidies to our competitors. Our nickel all comes from a small area in Ontario, next door to the U.S. market, but there are vast nickel deposits owned by others in many parts of the world.

Competition Not Restricted

"The company has no agreement with any of its competitors which prevents their competing with it in the sale of nickel in the U.S. market or elsewhere. The facts are simply that we have produced better nickel and have better served U.S. users. The company's position in the industry is the result of engineering and metallurgical leadership and of unceasing research over half a century to create new alloys of nickel and to expand uses for them. Our plant property in the U.S. consists almost entirely of our rolling mill at Huntington, West Virginia, and represents barely 4 per cent. of the company's total plant property. Although it accounts for only a small percentage of world nickel sales, it has promoted the production, export, and usefulness of Canadian nickel by serving over the past quarter century as the mainspring in the development of high nickel alloys. This is a service to industry and to the U.S. Government which only a producer of the raw material could have the incentive to render."

LETTER TO THE EDITOR

Air Travel for Trade

SIR,—For the adequate development of overseas trade, both "visible" and "invisible," the greatest possible freedom of travel between country and country is essential. Now that travel by air has become customary—and, indeed, in many parts of the world indispensable—international agreement on an all-round mitigation of regulations governing the issue of visas is sorely needed.

It might well be accepted by all Governments that passengers by air should be regarded as "legitimate" travellers, having satisfied responsible officials in their native country that their health and passports are satisfactory. Fingerprinting might well be abolished, and many of the personal questions included in forms of application for visas might be omitted on the assumption that possession of a passport implied a guarantee of status. Passengers holding return tickets to the country of departure might be exempted from the duty of seeking a "return visa."

During the past nine months this Institute has received representations from many of its members in respect of irksome, time-wasting and frequently expensive formalities which, cumulatively, amount to a serious handicap upon legitimate trade. An international conference charged with adapting international travel regulations to modern communications appears overdue, and my council will be glad to collaborate with organisations in any part of the world with a view to convening such a conference upon the broadest possible lines.—Yours faithfully,

ALFRED J. TOWNSEND,
Secretary, The Institute of Export,
Royal Empire Society Building, Northumberland Avenue, London, W.C.2.
May 29.

Zinc production has been resumed in the Marghera works, one of Italy's most efficient units in this field. As soon as adequate electricity supplies become again available, production of electrolytic zinc is to be resumed in Crotone. Italy's zinc output, which amounted to 36,000 tons in 1939, covered domestic requirements and left a small export surplus.

Personal Notes

PROFESSOR M. POLANYI, head of the Department of Physical Chemistry at Manchester University, has been succeeded, as president of the Manchester Literary and Philosophical Society, by Professor T. B. L. Webster, Professor of Greek.

MR. HARRY ARNOLD, a director of B. Laporte, Ltd., since the company was incorporated in 1908, and chairman from 1928 to 1943, has retired by rotation and did not offer himself for re-election on account of advanced age.

CAPTAIN C. A. KERSHAW, who has been appointed secretary-general of the Engineering Industries Association, formerly served in the Royal Navy and was later associated with the coal industry. In the 1920's, he played rugby for England and the Navy.

DR. L. MORANDI and DR. C. FAINA have been appointed joint chiefs of the administrative board of the Montecatini group in place of SIGNOR REBUA, who resigned. SENATOR MARIO ABBIATE has been elected president and DR. FAUSER vice-president, respectively.

MR. W. ROWAN, who has been appointed works manager of the keg and drum factory of Reads, Ltd., Liverpool, assisted his father in Wm. Rowan & Sons, Ltd., general engineers, Glasgow, before accepting an appointment as an engineer in the East. On his return, he was joint works manager with Metal Containers, Ltd., for six years prior to joining the Anglo-Iranian Oil Co., Ltd., in 1942, as drum plant superintendent for the War Office at Haifa, Abadan and Suez.

SIR HENRY TIZARD, F.R.S., President of Magdalen College, Oxford, and PROFESSOR H. C. SHERMAN, who occupies the Mitchill Chair of Chemistry at Columbia University, New York, have been selected as recipients, for 1946, of the Franklin Medal, awarded annually to "those workers in physical science or technology, without regard to country, whose efforts have done most to advance a knowledge of physical science or its applications."

PROFESSOR C. C. PRICE, who is professor of chemistry at the University of Notre Dame, Indiana, will receive the $1,000 American Chemical Society Award in Pure Chemistry at the Society's annual meeting in September. The award is given "for highly creative work in the study of the reactions of olefinic and aromatic compounds—particularly in connection with the mechanism of vinyl polymerisation and aromatic substitution."

MR. ANDREW FAIRWEATHER, formerly general manager of Broken Hill South, Ltd., has been awarded the Australasian Institute of Mining and Metallurgy Medal for 1945 in recognition of his long and efficient service to the mining industry, his valuable contributions to the industrial phase of Broken Hill operations, and also for the splendid work he has done in guiding and introducing mining students to the profession.

PROFESSOR H. G. K. WESTENBRINK, of the State University of Utrecht, who, during the German occupation of Holland, continued with his work in Amsterdam as Director of the Chemical Department of the Netherlands Cancer Institution, was among a party of Dutch scientists who arrived in this country last week to visit universities. The party also includes PROFESSOR J. M. BIJVOET, Professor of Universal Chemistry at the University of Utrecht, and PROFESSOR B. C. P. JANSEN, Professor of Biological Chemistry at the Institute for Nutrition Research.

SIR JACK DRUMMOND, scientific adviser to the Ministry of Food, is leaving to take up his previously reported appointment as director of research to Boots Pure Drug Co., and DR. T. MORAN, Director of Research and deputy scientific adviser, is returning to his post as director of the Cereals Research Station in charge of the laboratories, British Flour Millers. Pending the appointment of a successor to Sir Jack Drummond, DR. M. PYKE, who has returned to the Ministry's service from the Control Commission of Austria, will take charge of nutritional matters, and DR. H. R. BARNELL will deal with technical problems in regard to particular commodities.

INSECTICIDE MANUFACTURERS

At the recent annual general meeting of the Association of British Insecticide Manufacturers, the following were elected as the officers and executive committee for the ensuing year: *Chairman*, MR. T. A. ROBERTSON (Plant Protection, Ltd.); *vice-chairman*, MR. H. J. JONES (Hemingway & Co., Ltd.); *hon. treasurer*, MR. E. Z. BOLT (G. H. Richards, Ltd.); *hon. auditor*, MR. J. S. MITCHELL (Murphy Chemical Co., Ltd.). *Executive committee*, Mr. E. Z. Bolt (G. H. Richards, Ltd.), Mr. R. A. Blair (Burt Boulton & Heywood, Ltd.), Dr. J. R. Booer (F. W. Berk & Co., Ltd.), Mr. E. T. Buggé (Buggés Insecticides, Ltd.), Mr. R. V. Craven (W. J. Craven & Co., Ltd.), Mr. J. E. R. Simons (Geo. Monro, Ltd.). The offices of the Association are at 166 Piccadilly, London, W.1.

Control of Atomic Energy

Atomic Scientists' Memorandum

A MEMORANDUM issued by the Atomic Scientists' Association stresses the urgent importance of securing early international agreement for an effective system of international control of atomic energy, based on the principle that all production of the material essential for the manufacture of the atomic bomb should be carried out under the direction of an international authority responsible to the United Nations Organisation. It takes the view that the inspection scheme that would be required to implement this is technically practicable.

It is recommended that existing secrecy rules be lifted, starting forthwith with the release of all basic scientific information, and that eventually all research and development be carried on freely and openly with a duty to report to UNO any significant results.

All major sources of raw materials, it is advocated, and all major production plants should be handed over to UNO and operated (possibly by national contractors) under international management boards responsible to UNO, and guarded by men also responsible to, and appointed by, UNO. The United Nations Atomic Energy Commission should undertake the construction and operation of new large-scale plants for the production of fissionable material. These plants should be so distributed throughout the world as to ensure that if any nation should seize control of the plants operating in the area in which its own armed forces are predominant the remainder of the United Nations would jointly possess an overwhelming superiority in the production of fissionable material.

For the implementing of their proposals the Association is impressed with the feasibility of the recommendation made in the Acheson Report of the division of atomic energy activities into "safe" and "dangerous" activities and considers that an approach of this kind gives promise of an effective control of atomic energy developments together with a minimum encroachment on national sovereign rights.

German Technical Reports

Particulars of Latest Publications

SOME of the latest technical reports from the Intelligence Committees in Germany are detailed below. Copies are obtainable from H.M. Stationery Office at the prices stated.

CIOS XXXIII—30. Stickstoffwerk-Hibernia Wanne-Eickel-Ruhr: Recovery of hydrocarbons from coke-oven gas (1s.).

BIOS 137. (Appendix). *Cyclopolyolefines (paper by Dr J. W. Reppe, I.G. Farben Research Chemist)* (2s.).

BIOS 355. *Recent advances in the chemistry of carbon monoxide* (1s. 6d.).

BIOS 367. *I.G., Ludwigshafen*: Manufacture of 1 : 4 butinediol; including manufacture of 1 : 4 butinediol and tetrahydrofuran, precautions in handling acetylene and semi-technical preparation of 1 : 4 butinedial (11s. 6d.).

BIOS 376. *Recovery of aluminium alloys from aircraft scrap* (8s.).

BIOS 396. *Report on visit to Germany and Austria to investigate alloys for use at high temperature* (8s.).

BIOS 418. *I.G. Farben, Höchst*: Manufacture of textile auxiliary products (4s.).

BIOS 420. *Chemische Fabrik Pfersee G.m.b.H., Augsburg*: Textile auxiliary products (1s.).

BIOS 421. *I.G. Farben, Ludwigshafen*: Textile auxiliary products (1s.).

BIOS 424. *Chemische Fabrik Dr. Jacob—Bad Kreuznach*: Manufacture of carbon bisulphide, thiourea, and ammonium thiocyanate (3s.).

BIOS 426. *Maschinenbauanstalt Venuleth and Ellenberger*: German organic chemical industry (1s.).

BIOS 429. *German electroplating industry* (8s. 6d.).

BIOS 433. *Investigation of German plastics plants: Part IV. Additional information on thermosetting resins and processing of polystyrene* (8s. 6d.)

BIOS 436. *Röhm und Haas, G.m.b.H., Darmstadt*: Enzyme products and "Acrisin" finishing agents for textiles (2s.).

BIOS 447. *Interrogation of Dr. Otto Roelen, of Ruhrchemie A.G.*: Fischer-Tropsch process. Information concerning the synthesis and other developments. The "O x O" synthesis (6s.).

INSTITUTE OF PHYSICS

At the annual general meeting of the Institute of Physics, on May 29, the following were elected to take office on October 1: president, Prof. A. M. Tyndall; vice-presidents, Prof. J. A. Crowther, Dr. H. Lowery and Mr. A. J. Philpot; hon. treas., Mr. E. R. Davies; hon. sec., Dr. B. P. Dudding; new ordinary members of the board, Dr. A. McCance, Mr. W. S. Vernon, Dr. F. A. Vick. Dr. G. F. C. Searle, F.R.S., was elected an honorary Fellow of the Institute.

At a luncheon held before the general meeting, the past and present members of the board presented Professor Crowther with a testimonial recording, on behalf of the members of the Institute, their appreciation of his 14 years' devoted service as hon. secretary of the Institute. The report for 1945 shows that membership increased by 307 the highest since the Institute was founded in 1918.

Parliamentary Topics

Uranium and Thorium Control

AT question-time in the House of Commons, Mr. Blackburn asked the Prime Minister whether the Government would support the proposal before the Atomic Commission of the United Nations that all significant supplies of uranium and thorium throughout the world be owned or controlled by the United Nations.

Mr. H. Morrison having replied that the Prime Minister was not aware that any such proposal had yet been made to the United Nations Commission, and that the Government preferred to make no statement in advance of the discussions in the United Nations Commission, Mr. Blackburn asked whether he was aware that this proposal was contained in the American Report on the control of atomic energy, and that it had the support of almost all informed opinion in both Britain and America, and whether he could not make some more welcoming statement about the proposal.

After some debate, Mr. Morrison said they would be ready to make a statement when the United Nations Commission had come to its conclusion; and Mr. Blackburn, in view of the unsatisfactory nature of the reply, gave notice that he would raise the matter at the earliest opportunity.

Carnauba Supplies

Lady Noel-Buxton asked the President of the Board of Trade whether he was aware that supplies of carnauba, candelilla and ouricuri were confined to a few manufacturers only and that other manufacturers were unable to fulfil export orders based on the controlled figures, owing to a great rise in future prices following de-control; and what steps he proposed to take.

Mr. Belcher: I am not aware that any manufacturer is unable to obtain supplies of these commodities at current world prices. The limitation on prices which importers could pay in the countries of origin was removed in October last as a consequence of the withdrawal of import control by the U.S.A. If the subsequent price increases have created difficulties for manufacturers who entered into commitments on the basis of prices ruling at the time of contract, the matter would seem to be one for negotiation between manufacturers and customers.

Mr. W. Shepherd: Will the Minister say what he is doing to restore the balance of these prices? The price of carnauba a few months ago was £300 a ton and it is now £1000 a ton. It is impossible to buy these materials on the market; I have been trying to buy them for some time without success.

Mr. Belcher: Because of the removal of the control at the end of last year, and probably because of the tremendous demand for these commodities, the price has risen. In the absence of a renewal of import control by the United States, there is very little we can do about it.

Linseed Oil

Replying to several members, Mr. Strachey outlined the present position of the linseed oil supply. Under a unified purchasing plan, the U.K., he said, was responsible for buying in India, and the U.S. for buying in Argentina. The allocation for 1946 was equitable, he thought, but supplies had not come forward as expected, partly because of famine conditions in India, which caused the Indian Government to ban exports, and partly because purchase negotiations in Argentina had been very prolonged. He was aware that a Russian commission had been negotiating for the purchase of linseed oil in South America; so long as Russia was not a member of the Combined Food Board she had a perfect right to do this. He was informed, however, that they had not yet been able to obtain any substantial quantities of the oil.

The allocation of our restricted supplies between the various using industries, such as paint and linoleum, was being made in consultation with the departments concerned; but, as the supply position must give cause for anxiety for some time to come, they were reviewing the allocations for all purposes. There were no absolute priorities in the matter.

In reply to a suggestion from Sir F. Sanderson that we might offer a price more comparable with what Russia is prepared to pay, Mr. Strachey asked members not to press for increases in prices of our important imports. That was a most dangerous thing to do.

Mr. Churchill: It is still more dangerous not to get them.

Value of Imported Sulphur

In reply to Sir B. Neven-Spence, Mr. Belcher reported that the average value per ton of sulphur imported from the U.S. in January-April, 1946, was £8.4 per ton, compared with £4.4 per ton in 1938, an increase of 91 per cent.

Aluminium Production

Mr. Timmons asked the Minister of Supply how many factories were on the production of aluminium process; and what was their weekly production.

Mr. Wilmot replied that there were three, with a total production of virgin aluminium averaging some 640 tons a week.

R.O.F. Producing Chemicals

Replying to Mr. F. Anderson, who asked the Minister of Supply his intentions in connection with the R.O.F., Drigg, and its continuance in production, Mr. Wilmot said the factory was being retained for the present on the production of chemicals and the breaking down of surplus ammunition.

Industrial Spectroscopy

Forthcoming Conference in London

THE Institute of Physics announces that its newly formed Industrial Spectroscopic Group will hold its first conference on July 5 (2.30 p.m.) and 6 (10 a.m.), at the Wellcome Research Foundation, 183 Euston Road, N.W.1. The conference will be open to all interested, without charge.

On Friday Dr. H. W. Thompson, of St. John's College, Oxford, will explain the significance of infra-red absorption spectroscopy for analytical purposes, and Mr. G. F. Lothian, of the South-West Essex Technical College, will discuss equipment for infra-red absorption measurements.

On Saturday morning Mr. Nickelson, of Woolwich Arsenal, will speak on recent progress in equipment for spectroscopic analysis, and Mr. A. Walsh, of the British Non-Ferrous Metals Research Association, will speak on spectroscopic light-sources for the analysis of metals and alloys. In the afternoon Mr. H. T. Shirley, of the Brown-Firth Research Laboratories, will read a paper on a statistical examination of sources of error in the spectroscopic analysis of alloy steel.

Prevention of Silicosis

Australians and Aluminium Therapy

SILICOSIS has for long been a menace to workers in Australian quartz mines and a major problem for mining companies and medical authorities. It has been particularly prevalent on the Bendigo field, in Victoria.

An indication of the keen interest which the Australian Institute of Mining and Metallurgy is taking in the question is the announcement that it has supported the Department of Post-war Reconstruction in sending Dr. W. E. George, of the Bureau of Medical Inspection, to North America for the purpose of investigating the well-known process of aluminium therapy there.

Application of results of oversea research to Australian mines will represent a great step forward in improving the health of miners by removing the threat of this dread occupational disease. It is emphasised, of course, that aluminium therapy does not aim at displacing other means of preventing silicosis, such as dust control, improved ventilation, and general hygiene. These indirect measures should never be relaxed.

General News——From Week to Week

On June 18 Professor Sir Howard Florey is leaving for South Africa to lecture, for the British Council, on penicillin.

The gum used on the back of postage stamps is the purest obtainable, states the Post Office, and comes from the Sudan.

Publication will be resumed on July 1 of *Science Progress,* a quarterly review of scientific thought, work and affairs, founded in 1907 by Sir Ronald Ross.

The annual meeting of the British Standards Institution will be held at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, on July 16, at 3.30 p.m., with Lord Woolton in the chair.

"Hints to Business Men visiting British West Indies and Bermuda" is the title of the latest booklet issued by the Export Promotion Department of the Board of Trade.

The Coal Tar Products Prices Order, 1946 (S.R. & O., 1946, No. 752), which came into force on May 25, amends previous Orders in the series by providing (a) for an increase of 2d. per unit in the price of crude anthracene; and (b) for increases in the prices of the various grades of unrefined crude anthracene set out in the first schedule of the original order.

A co-ordinating committee on colour and lighting in industry is to be formed under the auspices of the British Colour Council. The names of members will be announced in the near future.

The British Legion Unit for Rheumatology—a one-year scheme for the intensive treatment of arthritis and rheumatism and allied diseases—has begun its work at the Three Counties Emergency Hospital, Arlesey, Beds.

An Economic Bureau for Palestine, now established at 12 Buckingham Palace Mansions, Buckingham Palace Road, London, S.W.1 (tel., SLOane 1000), will provide up-to-date economic information on Palestine and will function as a liaison office and information centre for both Palestine organisations and official and semi-official bodies in the U.K.

The first post-war joint meeting of the Scottish sections of the Chemical Society, R.I.C. and S.C.I., was held in Aberdeen recently, when a large and representative company visited the Rowett Research Institute, the Torry Research Station, and Macaulay Institute for Soil Research. Professor E. K. Rideal gave a lecture on "Present Trends in Chemical Research."

A science laboratory assistant at the Sir John Cass Institute, London, E.C., since he left South-West Essex Technical College four years ago, Daniel Boyd, aged 18, of Walthamstow, has secured the Brackenbury Scientific Scholarship, valued at £100, for entry to Balliol College, Oxford.

The British Iron and Steel Research Association has been elected to membership of the Parliamentary and Scientific Committee, and will be represented thereon by Dr. A. McCance and Sir Charles Goodeve. The Institution of Metallurgists is also considering applying for membership, and it is understood that their application will be favourably received.

The emergency penicillin plant, set up in 1944 at Daleside Road, Nottingham, by Boots Pure Drug Company, closed on May 31, now that the new deep culture plants at Barnard Castle and Speke are in full operation. The Nottingham plant, which used the milk-bottle method, was in operation only six months after the turning of the first sod in April, 1944, and was soon producing one-third of all the penicillin made in Europe. Its cost was £250,000. One result of the closing of this factory will be the return of nearly 1,000,000 milk bottles to the dairies.

Foreign News

The 1946 conference of the Chemical Institute of Canada will be held at Toronto from June 23-25.

Five Bavarian plants making refractory products have been restarted in recent months.

The Gold Coast exported 2,946,000 tons of manganese ore and 377,000 tons of bauxite during the war.

The chemical plant at Kalk, near Cologne, is producing fertilisers on a large scale, but soda production is dormant at present, owing to lack of fuel.

Preliminary engineering work has been completed in Jamaica for the exploitation of the island's bauxite reserves by an American concern, the Reynolds Metal Company.

More than eight tons of DDT have recently been used in Kenya in defeating an epidemic of relapsing fever. Deaths were kept down to 400 out of a total of 1500 African victims.

News has come from Burma of the use of Methoxone to combat the water-hyacinth in canals and swamps; and from the West Indies of its application to eradicate nut-grass—a serious pest in sugar plantations.

The Mur glass plant at Opole, in Polish Silesia, was opened in April. It has a monthly capacity of 150,000 sq. m. A bottle-glass factory was restarted in the same month at Zabrze (Hindenburg), the output of which will mainly be exported.

In Belgium, control measures on the production of zinc and tinplate have recently been lifted. The compilation of a monthly inventory of non-ferrous stocks has also been dispensed with.

Poland has nine cement kilns in the old territory and one in the newly-acquired areas. A large kiln was scheduled to resume operations at Opole (Oppeln) and another at Podgrodzie during May.

Some glassware manufacturers from the Gablonz area of Czechoslovakia have been settled in the American zone of occupation, where they have been allotted eight special furnaces. Provision has been made for the supply of raw materials.

The coconut oil factory, which is being erected in Walu Bay, Suva, Fiji Islands, is reported to be near completion. It will produce coconut oil in its purest form, ready for export. Copra by-products will also be produced. The machinery has been imported from the U.K. and from Australia.

A Swedish Government delegation of ten persons flew to Moscow on May 24 for trade negotiations with the Soviet authorities. The last trade agreement between Russia and Sweden was concluded in 1940, and this is still in force. Trade talks will also soon be inaugurated with France and Italy by the Swedish authorities.

To combat the menace of the heaviest locust infestation in the island's history, ten tons of Gammexane were recently flown to Sardinia, at the instance of UNRRA, in six specially chartered Dakotas. Previous tests in North Africa had established the value of this insecticide against attack by locusts.

The manufacture of DDT in Japan is being permitted by American military authorities. The basic ingredient for DDT will be imported from the United States and it will be mixed with talc obtained from the mines at Sarusawamura, in East Iwai County, Iwate Prefecture. The Japan Steatite Industrial Co. (Nihon Kasseki Kogyo Kaisha) will pioneer in the undertaking.

Forthcoming Events

June 13-26. Dorland Hall, Lower Regent Street, London, S.W.1, 11 a.m. Johnson, Matthey & Co., Ltd.: exhibition of specialised products and services.

June 19. North-Western Fuel Luncheon Club. Engineers' Club, Albert Square, Manchester, 12.30 p.m. Mr. A. C. Hartley: "Operation PLUTO."

June. 20. Chadwick Public Lectures. The Chelsea Physic Garden, Swan Walk, Chelsea, S.W.3. Dr. Ellen M. Delf: "Plants in the Service of Mankind."

June 21. Society of Chemical Industry (Manchester Section). Central Library, St. Peter's Square, Manchester, 6.30 p.m. Professor H. Mark: "Molecular Structure and Mechanical Properties of High Polymers."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

W. E. POWELL & CO., LTD., Croydon, manufacturing chemists. (M. 8/6/46.) May 8, £600 debenture, to Eliminax Ltd.; general charge.

NORBRIT ALLOYS, LTD., Newcastle-on-Tyne, manufacturers of metal alloys. (M., 8/6/46.) May 8, mortgage to Northern Counties Permanent Building Society, securing £12,000 and further advances; charged on premises being works, etc., in Orchard Street and Whitefriars Place, Newcastle-on-Tyne; also May 8, £5000 charge, to Jas. Russell & Co. (Newcastle) Ltd.; charged on land and premises, etc., in Orchard Street, Whitefriars Place, and Hanover Street, Newcastle-on-Tyne. *Nil. December 31, 1945.

Company News

Negretti and Zambra, Ltd., is the new style of the well-known firm of instrument manufacturers, which has now become a limited company.

The final ordinary dividend of **Boots Pure Drug Co., Ltd.,** is to be raised from 12½ per cent. to 15 per cent., making the total annual payment 35 per cent., against 32½ per cent. Net profit for 1945-46 has risen from £554,139 to £619,459.

At the annual meeting of **Eaglescliffe Chemical Co., Ltd.,** on May 28, the recommendation of the directors that a final ordinary dividend of 7½ per cent. be paid was amended to 10 per cent., making 15 per cent. for 1945. For the previous year the final dividend was 5 per cent., making 7½ per cent. As announced in THE CHEMICAL AGE on June 1, net profit for the year was £13,290, against £12,652 for 1944.

B. Laporte, Ltd., announce an agreement to purchase a minimum 90 per cent. of the issued share capital of John Nicholson & Sons, Ltd., the well-known sulphuric acid manufacturers, with freehold works at Hunslet and Barnsley. The total issued share capital of the latter company is £144 000 in 1800 ordinary shares of £80 each, fully paid, and the agreed purchase consideration is the issue of 96,000 new ordinary £1 shares fully paid in B. Laporte, Ltd., to rank *pari passu* with the existing issue of ordinary stock as from April 1, 1946, or *pro rata*, according to the number actually acquired. The governing directors of John Nicholson & Sons, Ltd., have decided to retire from the board, but the executive directors remain with the company, so that continuity of management is assured. The Treasury has given consent to issue the new shares, and application for an official quotation will be made to the committee of the London Stock Exchange.

Lever Bros. and Unilever (N.V.) have now issued accounts for 1944, including the results of subsidiary companies overseas which could not be published during the war, together with amounts relating to some of the continental interests which only became known after the liberation of the Netherlands. Owing to lack of information, apart from profits actually remitted to the Netherlands, no profit or loss is included for the years 1939 to 1944 in respect of interests in Germany or in Central and Eastern Europe, nor, for the years 1941 to 1944, in respect of interests in the Far East. Consolidated net profit (after providing for taxation) for five years 1939 to 1943 was Fls.56,615,318, and for 1944 (including a considerable amount of profit relating to previous years) Fls.56,558,660, making a total of Fls.113,173,978. Subsidiary companies retained Fls.10,802,719 in the form of a net aggregate increase to their undistributed profits, so that the company's net profit for the six years 1939 to 1944 totalled Fls.102,371,259. Proposed dividends: 1939-43, 20 per cent. by an issue of fully-paid 4 per cent. redeemable cumulative preference shares, and 2.50 per cent. in cash: 1944, 4.45 per cent. in cash; total, 26.95 per cent.

New Companies Registered

Polarising Instruments, Ltd. (411,364).—Private company. Capital £100 in £1 shares. Manufacturers of and dealers in polarising equipment, chemicals, metals, etc. Director: H. S. B. Meakin. Registered office: 36 Victoria Street, S.W.1.

Barry & Collins, Ltd. (410,571).—Private company. Capital £100 in £1 shares. Manufacturers of and dealers in chemicals, gases, drugs, etc. Subscribers: Miss E. Barry, Mrs. R. M. Collins. Registered office: 18, Essex Street, Strand, W.C.2.

Berclo (Essex) Ltd. (411,104).—Private company. Capital £100 in £1 shares. Manu-

facturers of and dealers in chemicals, gases, etc. Directors: Mrs. S. M. Chopping, N. Chopping. Registered office: 1 London Road, Romford.

Bercio (London) Ltd. (411,105).—Private company. Capital £100 in £1 shares. Manufacturers of and dealers in chemicals, gases, etc. Directors: D. J. Stone, Mrs. V. E. Stone, E. I. Teale. Registered office: 27 Heath Drive, Gidea Park, Essex.

United Dyestuffs & Chemicals, Ltd. (411,083).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in dyes, dyestuffs, colours, chemicals, etc. Subscribers: D. Israel, L. King. Registered office: 3 Dyers Buildings, Holborn, E.C.1.

William Rapley, Ltd. (410,558).—Private company. Capital £100 in £1 shares. Chemical consultants, designers, research workers, etc. Subscribers: A. W. Rapley, Constance M. Goldring. Registered office: "Merrileas," Grove Lane, Chalfont St. Peter, Bucks.

Tonicol, Ltd. (410,831).—Private company. Capital £100 in £1 shares. Manufacturers, importers and exporters of and dealers in chemical and other preparations and articles, etc. Directors: W. G. Ruff, Rose L. Ruff. Registered office: 130 Atkins Road, S.W.12.

Maylen Manufacturing Company, Ltd. (411,593).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in goods of all kinds made wholly or partly from rubber, synthetic rubber, plastics, etc. L. H. Shaw signs as director. Registered office: 7-9 Holloway Head, Birmingham, 1.

A. H. Charles, Ltd. (411,094).—Private company. Capital £5000 in 4900 preference and 100 ordinary shares of £1 each. Manufacturing chemists, etc. Directors: A. H. Charles, Iris E. Charles, A. G. Charles. Registered office: 9 Collier Row Road, Romford.

William Batey & Co. (Exports) Ltd. (410,737).—Private company. Capital £2000 in £1 shares. Manufacturers of and dealers in chemical compounds and foodstuffs, chemists, druggists, etc. Directors: H. Park, H. Korda. Registered office: 63a Great Russell Street, W.C.1.

George Royston & Son, Ltd. (411,322).—Private company. Capital £10,000 in £1 shares. To acquire the business of chemical engineers and lead burners carried on at Barnsley as "Geo. Royston & Son." Directors: G. Royston, D. B. Royston. Registered office: Winter Grove Works, Pogmoor, Barnsley.

Birmingham Taybel Tray Company, Ltd. (410,573).—Private company. Capital £500 in £1 shares. Manufacturers of and dealers in plastics, rubber, bakelite, vulcanite, ebonite, celluloid, chemicals, paints, varnishes, etc. Directors: F. Bridgens, J. H. Brookes, A. Jelf. Registered office: 1, Avenue Road, Aston, Birmingham, 6.

Scientific & Industrial Developments, Ltd. (410,639).—Private company. Capital £1000 in £1 shares. Investigation of products in connection with the chemical, metallurgical and engineering trades, and all businesses allied thereto, etc. Directors: W. Francis, H. Shaw. Registered office: Town Mill Brow, Rochdale.

Lancashire Chemical & Mineral Co., Ltd. (410,954).—Private company. Capital £10,000 in £1 shares. To acquire the business of a chemical and mineral merchant carried on by W. H. Watson, trading as the Lancashire Chemical & Mineral Co., at 16 Deansgate, Manchester, 3. Directors: W. H. Watson, Eric Watson. Registered office: 16 Deansgate, Manchester, 3.

Brookdale Manufacturing Company, Ltd. (410,670).—Private company. Capital £300 in £1 shares. Manufacturers of and dealers in detergents, disinfectants, soaps, insecticides, bactericides, fertilisers, agricultural and horticultural preparations, etc. Directors: D. Flett, A. G. Ferguson. Registered office: 38 Bridge Lane, Bramhall Green, Stockport.

Head Wrightson Light Alloy Structures, Ltd. (411,027).—Private company. Capital £100 in £1 shares. Manufacturers of chemical engineering and other structures (portable and otherwise), etc. Directors: Sir T. G. Wrightson, R. Miles, J. G. Wrightson, K. W. Hickman, S. T. Robson, F. J. Walker. Registered office: Teesdale Iron Works, Trafalgar Street, Thornaby-on-Tees.

Chemical and Allied Stocks and Shares

GENERAL conditions in stock markets this week showed little change from last week, the undertone being very firm, despite absence of improvement of business in most sections. British Funds fully held recent gains, with 2½ per cent. Consols and Local Loans favoured, while partly owing to satisfaction with dividend announcements, leading industrials again moved higher, shortage of shares in the market tending to make prices respond strongly to demand. Home rails lost ground on further consideration of the higher charges and fares, it being realised that the latter will in no way increase the fixed rental received by the railways under the existing control agreement. Other nationalisation groups were mostly dull, iron and steels having receded further, although selling was not heavy. Owing to the vagueness of Government statements, there are conflicting views current in the market as to how individual companies will be affected.

Imperial Chemical at 44s. 9d. were

well maintained, and higher dividend hopes strengthened British Oxygen to 100s. Turner & Newall rallied to 90s. 6d., while Associated Cement rose to 68s. on the financial results. B. Laporte were firm at 96s. 4½d. following the news of the acquisition of John Nicholson & Sons, sulphuric acid manufacturers, and the proposed issue of shares in connection with the deal. United Molasses rallied strongly to 56s. 9d. on further consideration of the past year's results; and there was increased activity in the units of the Distillers Co. on higher dividend hopes, the price after advancing over 130s. coming back to 128s. 9d., which, however, represents a good rise on balance. British Plaster Board strengthened to 38s. Elsewhere, Triplex Glass were good at 45s. 3d. on the increased exports of motor cars, which it is assumed, connotes growing peace-time demand for the company's main product. It is also assumed in the market that in due course the Triplex dividend is likely to regain pre-war levels. A similar assumption is generally held in regard to Wall Paper Manufacturers deferred units, which at 47s. were also above the level of a week ago. Lever N.V. fell back, profit-taking following the dividend statement; while Lever & Unilever eased to 57s. 6d.

Reflecting the financial results, Greeff-Chemicals Holdings 5s. ordinary have been firm at 12s. Morgan Crucible first preference marked 29s. 6d. and the second preference 26s. 6d. Business around 13s. was recorded in British Tar Products, and around 12s. 7½d. in British Lead Mills. Lawes Chemical 10s. ordinary were 14s. 3d. In other directions, Ruston & Hornsby rose further to 66s. in anticipation of the dividend. Most iron, coal and steel shares have been hesitant, but in a few instances earlier declines were partly regained, Davy & United Engineering being favoured at 38s. 9d., with Neepsend Steel 35s. 6d., and Staveley 46s. 9d. United Steel have yielded further ground at 22s. 9d., also Dorman Long at 25s. 3d., and Guest Keen at 42s. 9d. Bleachers, in textiles, lost part of their recent advance, easing to 17s. 1½d. pending the decision as to a payment in respect of arrears on the preference shares. Barry & Staines attracted attention at 61s. 9d. despite the small yield: this is a case where it is generally expected that in due course dividends are likely to be restored to the pre-war rate. Dunlop Rubber advanced to 69s.

Boots Drug on the higher dividend were good at 60s. 7½d. xd, with Sangers 33s. 3d. Timothy Whites 47s., Beechams deferred 25s., and Griffiths Hughes 60s. 9d. British Glues & Chemicals kept firm at 14s. 4½d., and activity around 45s. was shown in Blythe Colour 4s. ordinary. Shell advanced to 96s. 3d. on hopes of an increase in the forthcoming dividend. Anglo-Iranian and Burmah Oil also moved higher on balance, most oil shares participating in the upward trend, although best levels were not held.

British Chemical Prices

Market Reports

STEADY conditions have prevailed in most sections of the London chemicals market during the past week and no changes of importance have been reported. Inquiries for new business cover fairly good quantities, and deliveries against existing contracts have been satisfactorily maintained. In the soda products section there has been a good demand for chlorate, bichromate, and prussiate of soda, with the undertone firm on a relatively limited supply position. All the potash products find a ready outlet. Formaldehyde remains a good market and there is a continued active inquiry for acetic acid. There has been no outstanding feature in the coal-tar products market, where a moderate expansion in inquiry for new business has been reported. Export demand for cresylic acid is good, while pitch remains firm.

MANCHESTER.—Generally firm price conditions have been maintained on the Manchester chemical market during the past week in both heavy and light descriptions, and this is expected before long to result in advances in a number of directions. Home trade users in the textile and other consuming industries in Lancashire and the Yorkshire West Riding are taking steady contract deliveries, and a fair amount of new buying, covering a wide range of products, has been reported. Shippers have also been in the market with additional inquiries for export and steady bookings are being made. There is a brisk demand for most classes of tar products in both the light and heavy sections, and the undertone is strong throughout.

GLASGOW.—In spite of local holidays in Glasgow, business was brisk in the Scottish heavy chemical market in the past week for both home and export trade. All classes of heavy chemicals and raw materials were well in demand. There is, as yet, no improvement in the supply position, and prices are showing every tendency to rise. There is general expectation that with the announcement regarding freight and carriage increases, an over-all upward trend in prices will take place in the near future. The recent dock strike in London has been responsible for considerable delay in effecting shipment of outstanding orders, but fertilisers, formaldehyde, zinc oxide, and sodium hyposulphite, and the complete range of tanning chemicals, are in very great demand for the export market.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each. Numbers given under "Applications for Patents" are for reference in all correspondence up to acceptance of the complete specification.

Applications for Patents

Metal polishing.—International Corrodeless Ltd., and W. A. Sparks. 12195.

Textile processing.—E. S. Lane, and I.C.I., Ltd. 13658, 13659.

Ammonium compounds.—E. S. Lane, A. Lowe, J. A. Moyse, and I.C.I., Ltd. 13660.

Fuel residue separating.—W. B. Lane. 13277.

Colouring materials.—F. C. Leppard. 13084.

Insecticides.—W. C. Little, and A. Sherman. 13356.

Soap.—D. E. Marshall. 13003.

Chemical process.—Merck & Co. 13242-43.

Oxygen liberating compositions.—Mine Safety Appliances Co. 13651-52.

Zinc separating.—N.V. Philips Gloeilampenfabrieken. 12972.

Starch preparations.—N.V. W. A. Scholten's Chemische Fabrieken. 13539.

Waste wax paper utilisation.—National Oil Products Co. 13021.

Zinc vapour condensation.—New Jersey Zinc Co. 13404.

Zinc dust.—New Jersey Zinc Co. 13405.

Zinc condensers.—New Jersey Zinc Co. 13511.

Zinc smelting.—New Jersey Zinc Co. 13580.

Organic compounds.—Parke, Davis & Co. 13203.

Catalysts.—P. W. Reynolds, and I.C.I., Ltd. 13493.

Foam generation.—Rockwood Sprinkler Co. of Massachusetts. 12999.

Coating surfaces.—Schori Metallising Process, Ltd. (W. D. Jones.) 13090.

Metallic frictional material.—Schori Metallising Process, Ltd. (W. D. Jones.) 13092.

Bi-metal articles.—Sheepbridge Stokes Centrifugal Castings Co., Ltd., and F. W. Stokes. 13533.

Safety glass.—Soc. des Usines Chimiques Rhône Poulenc. 13075.

Antibiotic substances.—E. R. Squibb & Sons. 13426-27.

Metal powder products.—A. H. Stevens. (Metals Disintegrating Co., Inc.) 13655.

Treatment of yeast.—Svenska Jästfabriks A/B. 13206.

Electrodeposition of nickel.—Udylite Corporation. 13288.

Electrodeposition of metals.—Vandervell Products, Ltd., D. F. Green, N. P. Mallet, and J. M. Briscoe. 13017.

Diamines.—Wellcome Foundation, Ltd., J. A. Goodson, J. H. Gorvin, K. S. Kirby, and T. M. Sharp. 13218.

Antibiotic compounds.—Abbott Laboratories. 13838.

Metal treatment.—F. A. Allen, and F. P. Golby. 14216-17.

Recovery of metallic magnesium.—Aluminum Co. of America. (United States, June 20, '44.) 13780.

Treatment of magnesium.—Aluminum Co. of America. (United States, October 8, '45.) 14376.

Coating agents.—American Cyanamid Co. 14012.

Hydrogen copolymers.—C. Arnold. (Standard Oil Development Co.) 14228, 14231.

Aromatic amines.—C. Arnold. (Standard Oil Development Co.) 14229.

Phosphate coating processes.—M. Bareut, S. W. Johnson, and Pyrene Co., Ltd. 14259.

Complete Specifications Open to Public Inspection

Process for the emulsion polymerisation of vinyl and/or vinylidene halides.—N.V. de Bataafsche Petroleum Mij. November 4, 1944. 34997/45.

Removing carbon monoxide from gases containing the same.—N.V. de Bataafsche Petroleum Mij. October 19, 1943. 7168/46.

Polythionate and polythionic acid preparations.—Norsk Sulfo A/S. January 2, 1941. 7198/46.

Stabilising solutions of polythionates or polythionic acids.—Norsk Sulfo A/S. January 2, 1941. 7201/46.

Stabilising solutions of polythionic compounds.—Norsk Sulfo A/S. January 2, 1941. 7203/46.

Aromatisation process.—Shell Development Co. September 8, 1942. 13484/44.

Granulation of fertilisers.—S.A. des Manufactures des Glaces et Produits Chimiques de Saint Gobain, Chauny & Cirey. November 2, 1944. 29055/45.

Isomerisation of normal paraffins.—Standard Oil Development Co. August 15, 1941. 8919/42.

Production of toluene.—Standard Oil Development Co. August 1, 1941. 15516/42.

Catalytic processes.—Standard Oil Development Co. December 30, 1941. 815/43.

Solvent extraction of hydrocarbons.—Standard Oil Development Co. August 29, 1942. 10472/43.

Complete Specifications Accepted

Methylation of olefines.—General Motors Corporation. December 3, 1942. 577,112.

Process for the preparation of a varnish with a basis of flexible phenol-formaldehyde resin.—Les Vernis Duroux. March 26, 1941. 577,102.

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Manufacture of alkali metal sulphides.—A. P. Lowes, and I.C.I., Ltd. February 1, 1940. 577,034.

Production of 2-amino pyrimidine.—Manchester Oxide Co., Ltd., D. E. Wheeler, and P. Krug. April 5, 1944. 577,119.

Process for producing chlorine dioxide.—Mo och Domsjö A/B. June 2, 1943. 577,054.

Arómatic amine-aldehyde resinous products.—Norton Grinding Wheel Co., Ltd. July 23, 1942. 577,021.

Catalysts.—D. H. P. Peel, and I.C.I., Ltd. October 23, 1940. 577,008.

Purification of saline liquids.—Permutit Co., Ltd., R. T. Pemberton, and E. L. Holmes. December 22, 1941. 576,969.

Apparatus for rendering saline water potable.—Permutit Co., Ltd., R. T. Pemberton, and E. L. Holmes. December 30, 1941. 576,970.

Preparation of cation-exchange materials.—Permutit Co., Ltd., R. T. Pemberton, and E. L. Holmes. January 8, 1942. 576,971.

Manufacture of hard carbides.—E. A. Pokorny. December 22, 1942. 577,072.

Insecticidal preparations for use in buildings.—Rentokil (Sales), Ltd., and N. E. Hickin. May 9, 1944. 577,124.

Fluorescent materials.—Siemens Electric Lamps & Supplies, Ltd., and H. Austin. April 24, 1944. 577,089.

Glass melting tanks or furnaces.—W. J. Smith. November 12, 1942. 577,075.

Process for the continuous esterification of regenerated cellulose and the like.—Soc. of Chemical Industry in Basle. January 14, 1942. 577,103.

Process for the production of water gas and like synthesis gases.—M. Steinschlager. September 15, 1941. 577,015.

Aluminium-rich alloys.—H. Sutton, J. Thompson, and E. I. Brimelow. June 8, 1939. 577,067.

Mydriatic compounds.—Wellcome Foundation, Ltd. (Burroughs Wellcome Co. (U.S.A.), Inc.) April 28, 1944. 577,122.

Preparation of therapeutic substances.—Boots Pure Drug Co., Ltd., H. A. Stevenson, W. F. Short, and C. A. Hill. October 17, 1944. (Addition to 573,578.) 577200.

Resinous polymerisation products.—British Thomson-Houston Co., Ltd. June 23, 1942. 577,137.

Resinous polymerisation products.—British Thomson-Houston Co., Ltd. June 23, 1942. 577,288.

Luminescent materials.—British Thomson-Houston Co., Ltd. August 30, 1943. 577,302.

Methods of preparing tetrakis-2-chloroethyl silicate.—British Thomson-Houston Co., Ltd. April 19, 1944. 577,250.

Apparatus for extinguishing or preventing fires.—Cardox (Great Britain), Ltd. December 8, 1943. 577,188.

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THE British Drug Houses, Ltd., have vacancies for technical representatives to maintain contact between the Company and academic and industrial laboratories in the United Kingdom. Applicants for these posts should be graduates in chemistry or possess substantial experience in laboratory work. Salary £400-£500 p.a., according to experience, plus travelling and maintenance expenses. Applications, stating age, to be addressed to the Sales Manager, B.D.H. Laboratory, Chemicals Group, Graham Street, London, N.1.

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